Operating and Service Manual

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1704 SERIES GOULD 200 RECORDING SYSTEMS OPERATORS MANUAL

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SYSTEM CONFIGURATION

This solid state Mark 200 System, Model _____, incorporates the components that are noted in the list that follows.

QTY	COMPONENT AND MODEL NUMBER
_____	Preamplifier, Model _____
_____	Preamplifier, Model _____
_____	Preamplifier, Model _____
_____	Preamplifier Cage, Model 11-1202- _____
_____	Oscillograph, Model _____
_____	System Power Panel, Model 11-1603-12 _____
_____	System Power Panel, Model 11-1603-12813 _____
_____	Main Connector Panel, Model 11-1601-11 _____
_____	Internal Chart Take-Up Model 11-2231-01 _____
_____	External Chart Take-Up, Model _____
_____	Drive Amplifier, P/N 886220 _____
_____	Amplifier Calibration Unit, Model _____
_____	Event Marker Amplifier Assy, Model _____
_____	Event Marker Kit, Model 11-2221-02 _____
_____	_____
_____	_____
_____	_____
_____	_____

XXXX-1704-XXX

- XXXX: 1 & 2 use 11-1603-12 & 11-1601-11 Main and Power Panels
  4 & 5 use 11-1603-12813 & 11-1601-11 Main and Power Panels
- XXX: 80mm penmotors use one drive amp/channel
  40mm penmotors use one drive amp/channel
  8 Multimarker event penmotor use 13-5281-02 Multimarker amplifier

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SECTION I

GENERAL INFORMATION

1.1 SCOPE

This manual is written for operators of Gould 200 1704 Series Recording Systems. The manual contains System Descriptions, Specifications, Installation Procedures, Operator Instructions, Fault Location Tables, Drive Amp Calibration and Routine Maintenance.

1.2 SYSTEM DESCRIPTIONS

a. General

The 1704 Series is the newest generation of Gould 200 Systems combining an effective pen position feedback system, high torque penmotors, rectilinear pen motion linkage and pressurized fluid writing. Modular design allows the Gould 200 to be tailored to any recording requirement. Both vertical and horizontal read-out oscillographs are available as shown below, Figures 1-1 and 1-2.

Each recorder has space for from four to eight writing modules which may all be alike or intermixed. There are two basic modules and they are a 40-millimeter analog module with a full scale response of 60 Hertz or an 80 millimeter module with a full scale response of 30 Hertz. Each module consists of its own drive amplifier, pen and penmotor. There are four standard writing module configurations: Eight 40-mm channels, one 80-mm and six 40-mm channels, two 80-mm and four 40-mm channels, or four 80-mm channels. Event markers on the left and right margins are standard.

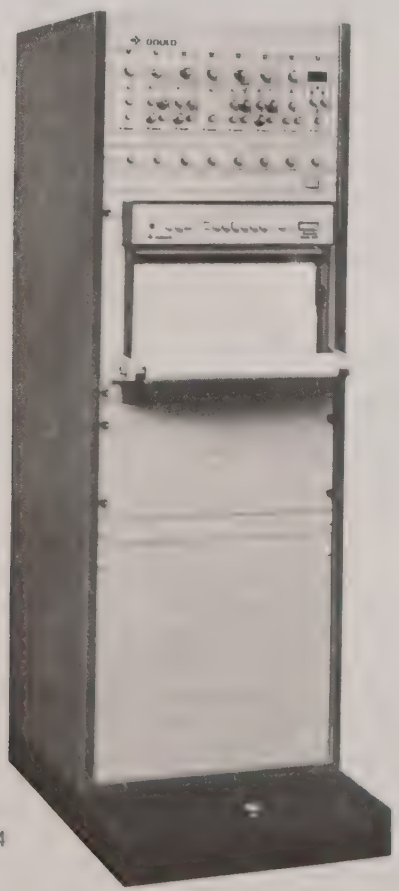

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FIGURE 1-1 GOULD 200 SYSTEM WITH VERTICAL OSCILLOGRAPH

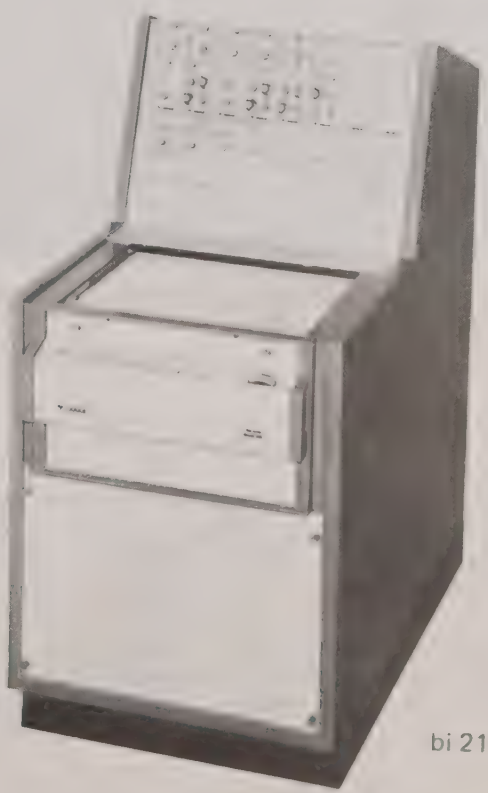

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FIGURE 1-2 GOULD 200 SYSTEM WITH HORIZONTAL OSCILLOGRAPH

b. Vertical Oscillograph

The Gould Multi-Channel Oscillograph, Model 2607-71 (Fig. 1-3) provides a new concept in versatility. Coupled with appropriate Gould components the oscillograph can be a part of four individual systems —— either all alike, or combined in any of a number of standard configurations. (See Para. 1.4 System Model Numbering.)

FIGURE 1-3 VERTICAL OSCILLOGRAPH

The writing system employs pressurized ink, assuring uniform, clear, rectilinear traces on low-cost rectangular-coordinate, graduated chart paper. Chart is delivered externally; or may be stored within the oscillograph on an easily accessible, optional, internal chart take-up.

Twelve chart speeds, from 0.05 millimeters to 200 millimeters per second, are selected by illuminated pushbuttons and may be changed instantly without loss of data. Two standard three-position event markers may be operated from external sources, or from an internal one-second, ten-second, and optional auxiliary timer.

The flush-mounted, vertical oscillograph features a highly visible illuminated readout surface and is designed throughout for convenience in use, easy chart paper loading, and functional versatility. The unit, occupying 15-3/4 inches of panel space is slide mounted and can be withdrawn to any point for ready access to event switches, fuses, and ink indicator. Paper supply drawer may be pulled out independently for chart loading without disturbing pens. When paper supply drawer is open, ink flow is stopped and pressure removed, preventing leakage from pens. Internal or external chart take-up is optional.

c. Horizontal Oscillograph

The horizontal oscillograph Model 2607-61 (Fig. 1-4) incorporates the same basic design features of the vertical model, but displays its data on a horizontal surface.

It is also a pull-out oscillograph and may be mounted at convenient desk height for easy annotation, ideal for computer read-out. Pull-out handles are fitted with spring loaded latches which hold the oscillograph in any position.

Unit may be pulled out to full depth for servicing. The chart speed and control mode pushbuttons plus paper supply indicator are mounted on sloped front panel for easy visibility. Timer-event marker selector switches are also readily available on front panel. External chart take-up is optional.

FIGURE 1-4 HORIZONTAL OSCILLOGRAPH

d. Main Connector Panel

The main connector panel Model 11-1601-11 (Fig. 1-5) is used to interconnect oscillograph and drive amplifier frame to main power source thru master power switch. The connectors and terminal boards on the panel provide a convenient location for the internal connections from the oscillograph, such as the event markers, operating voltages, limit contacts and remote control circuits. The internal connections from the preamplifiers such as coaxial cable inputs, mode inputs, and reference voltages, are also brought out to terminals on the main connector panel.

FIGURE 1-5 MAIN CONNECTOR PANEL

e. System Power Panel and Amplifier Calibration Unit

The system power panel Model 11-1603-12 (Fig. 1-6 is mounted on the front of the system cabinet and provides a convenient location of the main power switch. The power switch is a pushbutton ON–OFF switch which controls power to the entire system through the Main Connector Panel. The switch is illuminated when power is on to the system. There is a convenience outlet on some systems which is also mounted on the panel. The outlet is three-pronges and grounded for use with electrical devices requiring 115 volts 60 cps. The outlet is not controlled by the power switch. It is fused for 5 amperes maximum.

The amplifier calibration unit Model 0000-5403-21 (Fig. 1-7) was designed as an optional component to be used with the 4600 series preamplifiers to provide a precision reference source. The unit completely duplicates the function of the system power panel, which is removed when calibration unit is used, and provides for individual calibration of each drive amplifier channel. The unit is normally front panel mounted and located above vertical or horizontal oscillograph. It derives its power from the main connector panel and is interconnected by cable to the relay assembly.

The relay assembly portion of this unit mounts to the rear of the equipment rack. Power to energize the relay is supplied by amplifier calibration unit portion through a cable connected between preamplifier signal outputs and drive amplifier signal inputs.

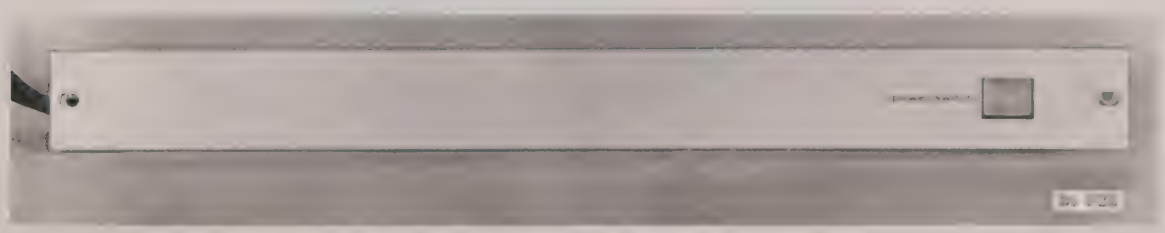


FIGURE 1-6 SYSTEM POWER PANEL

FIGURE 1-7 AMPLIFIER CALIBRATION UNIT

f. Drive Amplifier Frame Assy

The drive amp frame assembly consists of a front panel, rack mounting slides and a drive amp sub-assembly. The sub-assembly (Fig. 1-8) consists of a power supply with associated wiring, plug-in slots for one control timer board and up to eight drive amplifier boards. The above mentioned sub-assembly parts are housed in a drive amp frame.

The drive amp frame assy is mounted below the oscillograph on the cabinet or console. Access to the drive amps comes by removing the "Drive Amplifiers" panel on the front of the cabinet.

g. Preamplifier Kits

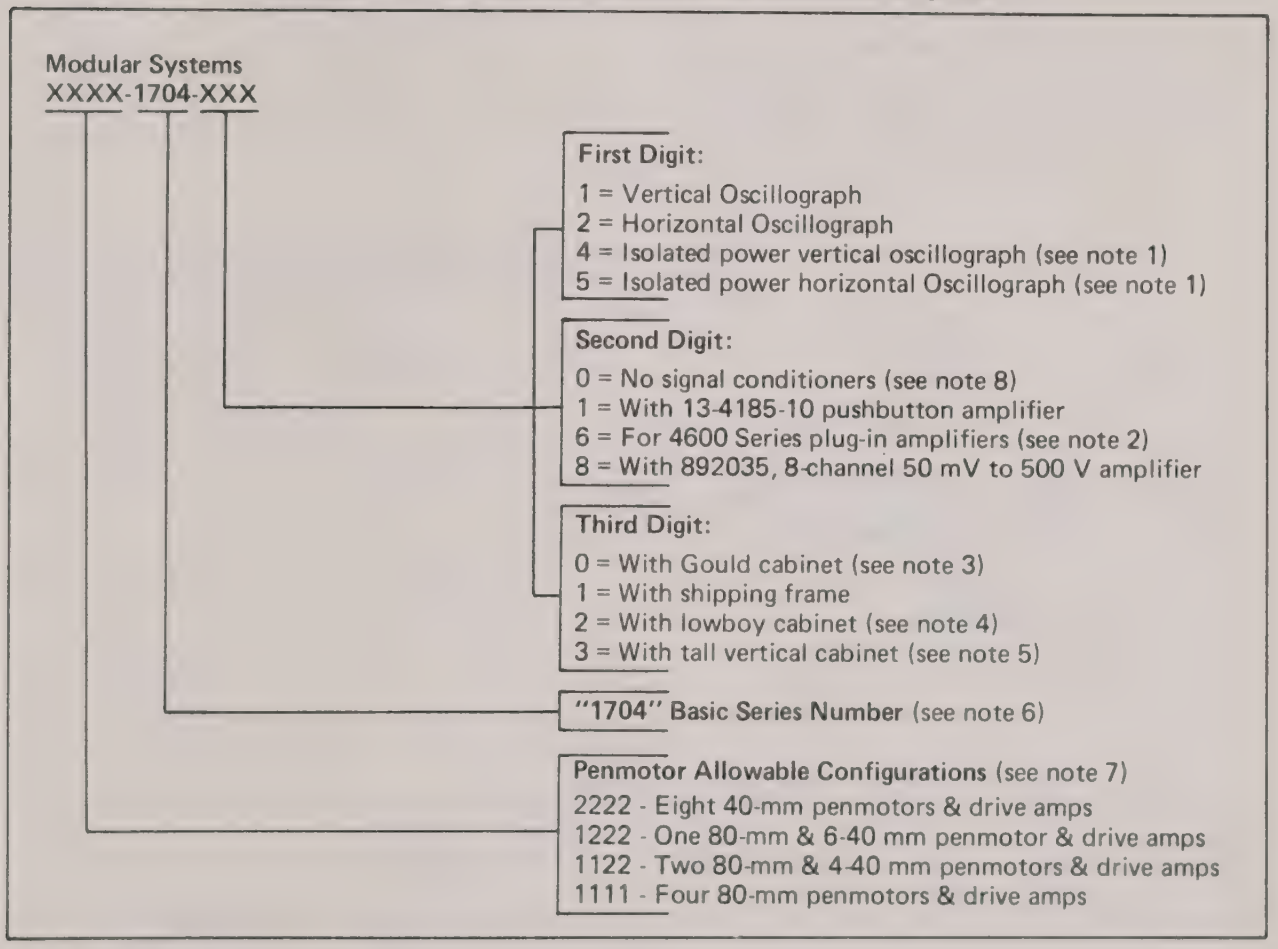
The preamplifier kit assembly is located above the oscillograph and contains the 4600 series plug-in preamplifiers if used. Power is supplied by the drive amp frame power supply. The assembly contains receptacles for signal and power input as well as output connectors for the preamps. Three kits are available: Model 11-1202-15 for vertical configurations; Model 11-1202-19 for horizontal configurations; and Model 11-1202-22 for horizontal configuration primarily with slope-front cabinets.

FIGURE 1-8 DRIVE AMP FRAME SUB-ASSEMBLY

1.3 SYSTEM MODEL NUMBERING

The model number of the Gould 200 1704 Series Recording System designates type of oscillograph (vertical or horizontal), type of signal conditioners, style of cabinet, and penmotor configuration. Table 1-1 below, describes the 1704 Series model numbering system.

TABLE 1-1 1704 SERIES MODEL NUMBERING SYSTEM


Modular Systems
XXXX-1704-XXX
First Digit:
1 = Vertical Oscillograph
2 = Horizontal Oscillograph
4 = Isolated power vertical oscillograph (see note 1)
5 = Isolated power horizontal Oscillograph (see note 1)
Second Digit:
0 = No signal conditioners (see note 8)
1 = With 13-4185-10 pushbutton amplifier
6 = For 4600 Series plug-in amplifiers (see note 2)
8 = With 892035, 8-channel 50 mV to 500 V amplifier
Third Digit:
0 = With Gould cabinet (see note 3)
1 = With shipping frame
2 = With lowboy cabinet (see note 4)
3 = With tall vertical cabinet (see note 5)
"1704" Basic Series Number (see note 6)
Penmotor Allowable Configurations (see note 7)
2222 - Eight 40-mm penmotors & drive amps
1222 - One 80-mm & 6-40 mm penmotor & drive amps
1122 - Two 80-mm & 4-40 mm penmotors & drive amps
1111 - Four 80-mm penmotors & drive amps

NOTES ON MODULAR SYSTEM:

1. -4XX and -5XX include 750 watt isolation transformer and low-leakage power cord (leakage current less than 30 μA at 115 Vac).
2. -X6X includes Model 11-1202-15, 4600 Series amplifier frame. (Vertical Cabinet Only.)
3. -XX0 vertical systems supplied with Model 11-1154-61 Gould vertical cabinet.
4. -XX2 horizontal oscillograph supplied with Model 11-1112-71 Gould lowboy cabinet.
5. -XX3 horizontal or vertical oscillograph supplied with Model 11-1170-62 Gould oversized base tall vertical cabinet. Must specify equipment locations from top to bottom.
6. "1704" basic system does not include Gould cabinet, drive amplifiers, penmotors, amplifier frame, or signal amplifier, chart take-up, or other accessories.
7. XXXX- each digit in the prefix stands for penmotor locations – from left to right, facing the oscillograph.
   1 = one 80-mm penmotor and drive amplifier.
   2 = two 40-mm penmotors and drive amplifiers.
8. To order systems for use with 4200 Series Preamplifiers, order XXXX-1704-X"O"X and add appropriate 4200 Series frame (11-4588-12, -13 or 14) as a separate line item. For Gould lowboy cabinets, also add 864524 panel extension.

1.4 SPECIFICATIONS

a. System

General

Weight . . . . . Approximately 375 pounds. (Less amplifiers and dependent on cabinet configuration.)

Paneling . . . . . Two-tone light and dark parchment.

Configuration . . . . . Refer to drawings for each model number in the installation section for dimensions and placement of components.

Electrical

NOTE: Complete system specifications are modified by characteristics of preamplifier used. Only basic drive system characteristics are listed below. Refer to individual preamplifier manuals.

Input Impedance (to drive amps) . . . . . 100,000 ohms ±1% single ended.

Signal Input Sensitivity . . . . . 100 millivolts per chart division full scale ±2.5 volts.

Polarity . . . . . Standard – Positive signal to drive amp. HI input causes pen to deflect left. Option – Polarity can be reversed by using inverting cable (PB792696) from drive amp to pen motor.

Pen Position Control (one per channel) . . . . . Range – ±100% of full scale (approx.) Infinitely adjustable ±5 Vdc.

D.C. Linearity . . . . . ±0.35% of full scale.

A.C. Linearity . . . . . ±0.5%

Rise Time . . . . . 10% to 90% .005 second (40mm); 10% to 90% .008 second (80mm).

Damping . . . . . Adjustable thru critical overshoot less than one division with full scale step.

Frequency Response . . . . . See Figure 1-9.

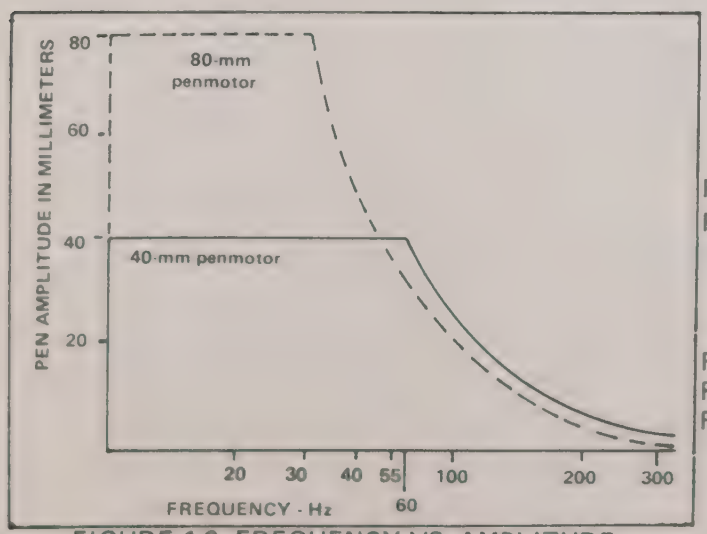


FIGURE 1-9 FREQUENCY VS. AMPLITUDE

40mm Channel

Flat dc to 60 Hz @ 50 divisions ±2% of F.S.
Flat dc to 135 Hz @ 10 divisions ±2% of F.S.

80mm Channel

Flat dc to 30 Hz @ 50 divisions ±2% of F.S.
Flat dc to 55 Hz @ 25 divisions ±2% of F.S.
Flat dc to 95 Hz @ 10 divisions ±2% of F.S.

	Zero	Gain
Stability (after 30 minute warm-up)	Time 0.1%/24 hr.	0.1%/24 hr.
	Temp 0.025%/°C.	0.05%/°C.
	Line Voltage 0.1%/10%	0.05%/10%.

Temperature Range . . . . . Operating: 0°C to +50°C. Storage: -40°C to + 70°C.

Power Input . . . . . 105 to 125 volts, 60 Hz, single phase. 700 Watts.

Power Requirements (@60 Hz) . . . . . 1. Ocillograph Chart Drive 225 Watts.
2. Max./channel including preamp 60 Watts.
3. Max. for complete system of eight channels including eight 4600 series preamps 700 Watts.

NOTE: Add approximately 100 Watts for 400 Hz system.

Input Circuit . . . . . Single ended, isolated common to 500 Vdc.

b. Oscillograph

No. and type of channels (Analog) . . . . . Four Standard Models: eight 40mm channels; four 80mm channels; one 80mm and six 40mm channels; two 80mm and four 40mm channels.

(Event) . . . . . Two standard; R and L margins. Up to seven additional interchannel event markers may be added.

Chart Description . . . . . 50 divisions, 40mm or 80mm widths.

Trace Presentation . . . . . Rectilinear.

Writing Method . . . . . Pressurized fluid (closed system) 2-oz fluid capacity.

Trace Width . . . . . .01 inches.

Writing Table . . . . . Vertical Unit: Chart travel down. Horizontal Unit: Chart travel horizontal.

Chart Capacity . . . . . High contrast - 500 feet (approximately 8 hours @ 5mm/sec).

Chart Speeds . . . . . 12, electrically selected; two ranges; .05, .1, .25, 5, 1, 2mm/sec; and 5, 10, 25, 50, 100 and 200mm/sec.

Chart Speed Accuracy . . . . . ±0.25% @ nominal line frequency.

Paper Control . . . . . Tracking error and wander less than .025 inch, 20 feet after rethreading. Either external discharge or internal chart take-up.

Interlock Light . . . . . Warns when chart paper supply is exhausted or writing table not positioned properly.

Signal Limiters . . . . . Built-in adjustable, instant acting electronic limiters prevent pen damage from off-scale overloads.

Dimensions Vertical ..... Panel height 15-3/4 inches; width 19 inches; depth 21 inches. Overhang beyond panel is 2-1/2 inches closed, 14-1/2 inches for paper loading, 24 inches maximum (all sides extended).

Dimensions Horizontal ..... Panel height 10-1/2 inches; width 19 inches; depth 21 inches. Overhang beyond panel is 2-1/2 inches closed, 23 inches maximum (fully extended).

c. System Power Panel

Dimensions ..... Height 1-3/4 inches, Width 19 inches, Depth 2 inches.

Power Cable ..... 7 feet long.

Power Switch Rating ..... 10 amperes at 115 volts A.C.

Power Switch Illumination ..... Neon in switch indicates "Power On".

Power Input ..... Approximately 20 watts at 115 volts. A.C. power is supplied from main connector panel.

d. Amplifier Calibration Unit (Optional)

Dimensions ..... Height 1 3/4 inches, Width 19 inches, Depth 6 3/4 inches.

Power Switch Rating ..... 10 amps at 115 volts A.C. maximum.

Power Switch Illumination ..... Neon light in switch.

Calibration Signal ..... ±2.5 volts into 5 K ohms.

Stability ..... Time: ±.1%/hour; ±.2%/mo. Temp: ±.1% over temp range: Range: ±65° F to +105° F. Voltage: ±.1% over 103 volts to 128 volts line voltage variation.

Pen Position Control ..... ±3 divisions minimum (front panel).

Span Control ..... ±5% of calibration signal (accessible from rear of unit).

Zero Reference Control ..... ±.5% set at factory (mounted inside unit).

Power Input ..... Approximately 20 watts at 115 volts A.C. power is supplied from main connector panel.

Storage Temperature ..... -40° F to +185° F.

Operating Temperature ..... +32° F to 131° F.

Humidity ..... 95% at +90° F.

1.5 SUPPLIES & ACCESSORIES

a. Supplies

Chart Paper

- Eight - 40mm channels 11-2983-504
- One - 80mm and six 40mm channels 1222-2943-502
- Two - 80mm and four 40mm channels 11-2963-502
- Four - 80mm channels 11-2943-51

Analog Pen (includes ink tube) 11-2823-35

Event Marker Pen (includes ink tube) 11-2821-22

Ink, Blue, 2 oz 11-2734-02

b. Accessories

Starter Kits - Each kit contains 12 rolls of high contrast semi-perforated chart paper, gram gage, one analog pen, pen adjustment wrench and lapping paper. Kit model numbers listed below.

- Eight 40mm channels 11-6250-37
- Two 80mm, four 40mm channels 11-6250-38
- One 80mm, six 40mm channels 11-6250-39
- Four 80mm channels 11-6250-40

Gram Gage 240601-910

Wrench, Pen Pressure 1-120922-18

Drive Amp Extender Card 887526

Band Assy for 40mm Penmotor 685270

Band Assy for 80mm Penmotor 684999

Tube Replacement Tool 267528

Chart Take-ups

- Internal, Full Roll, Vertical Oscillograph 11-2231-01
- External, Full Roll, Horizontal Oscillograph 11-2402-53
- External, Short Run, Vertical Oscillograph 11-2402-52
- External, Short Run, Horizontal Oscillograph 11-2402-54

Event Marker Kits (Factory Installed)

- Seven channel interchannel bi-directional 11-2221-02
- Standard bi-directional 792567
- Seven channel kit w/TTL drivers 13-5581-03
- Single channel amplifier (100 K ohms input) 11-5511-00
- Single channel amplifier (2.2 K ohms input) 11-5511-01
- Tee (connects analog and event pens to manifold part) 662095

SECTION II

INSTALLATION

2.1 SCOPE

This section describes the checks and inspections that should be made upon receipt of the Recording System. This section also contains the signal connections and installation instructions for the system components. As there are many optional items and accessories which may be put into a Gould 1704 Recording system, not all connection or installation instructions may be applicable.

2.2 INCOMING INSPECTION

1. Visually inspect unit for damage that may have occurred during shipment.
2. Remove packing and tape from oscillograph.
3. Remove sheet of chart paper from under pens and load chart paper supply roll into unit. (See Chapter VI for specific instructions.)
4. Check ink supply.
5. Check for loose cable connections.
6. Be sure main power switch is in off position.
7. Attach power input cable to connector J-1 on main connector panel.
8. Attach other end of power input cable to correct power source.

NOTE: Power source to be 115 volts nominal ±10%, @60Hz. Maximum of 705 watts for complete system with eight 4600 series preamps.

9. Connect signal input cable to connector J-3 on main connector panels with 13-4185-10.

NOTE: Signal input cables are connected directly to preamplifier frame on systems with 4600 series preamplifiers and 892035 preamp panel.

10. Perform preliminary operation procedure described in the operation of this manual.

2.3 SIGNAL CONNECTIONS

All external signals are applied to the main connector panel on the rear of the unit. These connections are as follows:

J-1 Power Input

Pin A	115 volts A.C. neutral in
Pin B	115 volts A.C. hot in
Pin C	Cabinet ground

J-2 External Functions

NOTE: Used with 13-4185-10 Series preamplifier (push-button models only).

Button	Pins
A	G, C
B	I, C
C	B, C
D	F, C

J-3 Signal Input

Not used with 4600 Series Preamplifiers or the 892035 preamp panel. Refer to preamp panel 13-4185-10 schematics for signal input connections.

J-4 Remote Chart Control

Pin A	Divide by 2
Pin B	Divide by 4
Pin C	Divide by 10
Pin D	Divide by 100
Pin E	Remote 28 volts — To Remote Switch
Pin F	External run
Pin G	28 volts neutral
Pin H	Motor Ind.
Pins I thru N	No connections

J-5 Event Marker Input Signals (For units with model numbers ending in 241).

Pin A	L.H. Marker external input (Left deflection)
Pin B	L.H. Marker neutral (Left deflection)
Pin C	L.H. Marker external input (Right deflection)
Pin D	L.H. Marker neutral (Right deflection)
Pin E	R.H. Marker external input (Left deflection)
Pin F	R.H. Marker neutral (Left deflection)
Pin G	R.H. Marker neutral (Right deflection)
Pin H	R.H. Marker neutral (Right deflection)
Pin I	+28 volts hot (chart moving)
Pin J	28 volts neutral

J-701A Connector to Oscillograph

Pin A	R.H. Marker in (Right deflection)
Pin B	Divide by 2 relay
Pin C	115Vac hot in
Pin D	L.H. Marker neutral (Right deflection)
Pin E	28 volts neutral
Pin F	R.H. Marker neutral (Right deflection)
Pin G	R.H. Marker neutral (Left deflection)
Pin H	L.H. Marker neutral (Left deflection)
Pin J	Chassis ground
Pin K	Divide by 100 relay
Pin L	L.H. Marker in (Left deflection)
Pin M	Motor relay (+28vdc on chart run)
Pin N	Divide by 4 relay
Pin P	R.H. Marker in (Left deflection)
Pin R	+28vdc on remote
Pin S	External Run (short to Pin R)
Pin T	L.H. Marker neutral (Right deflection)
Pin U	Divide by 10 relay
Pin V	L.H. Marker in (Right deflection)

2.4 OSCILLOGRAPH INSTALLATION

a. General

Oscillographs in most instances are factory installed in vertical cabinets, slope front cabinets, low boy consoles or shipping frames. Installation instructions are provided here for users installing their units in existing enclosures or if reinstallation becomes necessary.

CAUTION: Recording System may weigh in excess of 375 lbs. with oscillograph being the heaviest component. Use two men when removing or installing oscillograph.

b. Vertical Oscillograph

1. Slide oscillograph into front of unit.
2. Install one spacer and four screws on each side of oscillograph (Fig. 2-1) and slide oscillograph into unit.
3. Feed penmotor cables in thru rear of oscillograph.
4. Pull oscillograph out to open position.
5. Plug penmotor cable connectors into proper penmotors.

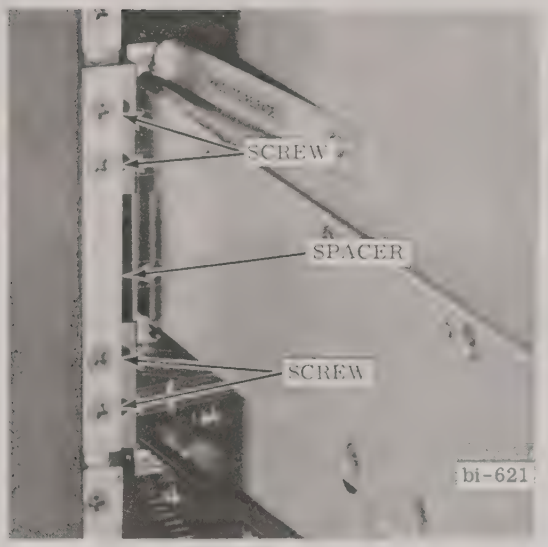


FIGURE 2-1 INSTALLATION OF VERTICAL OSCILLOGRAPH

6. Slide penmotor cables into notches on bottom of fuse panel assembly.

7. Position fuse panel assembly on mounting brackets and install four screws (Fig. 2-2).

8. Slide oscillograph into unit and tighten four captive thumbscrews.

9. Secure penmotor cables to rear of oscillograph with clamp and two screws.

10. Connect oscillograph cable connector to J-701 on rear of oscillograph (Fig. 2-3).

11. Position cover on rear of oscillograph and install seven screws and lockwashers (Fig. 2-4).

12. Outline dimensions for vertical oscillograph are shown in Figure 2-5.

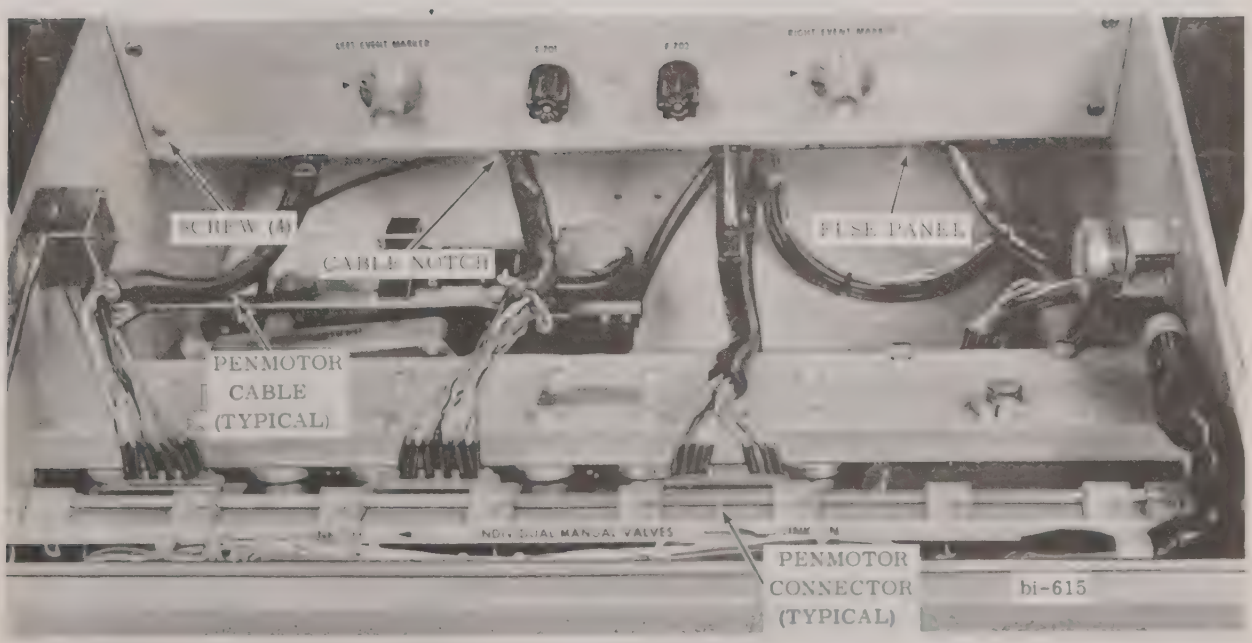


FIGURE 2-2 INSTALLATION OF VERTICAL OSCILLOGRAPH

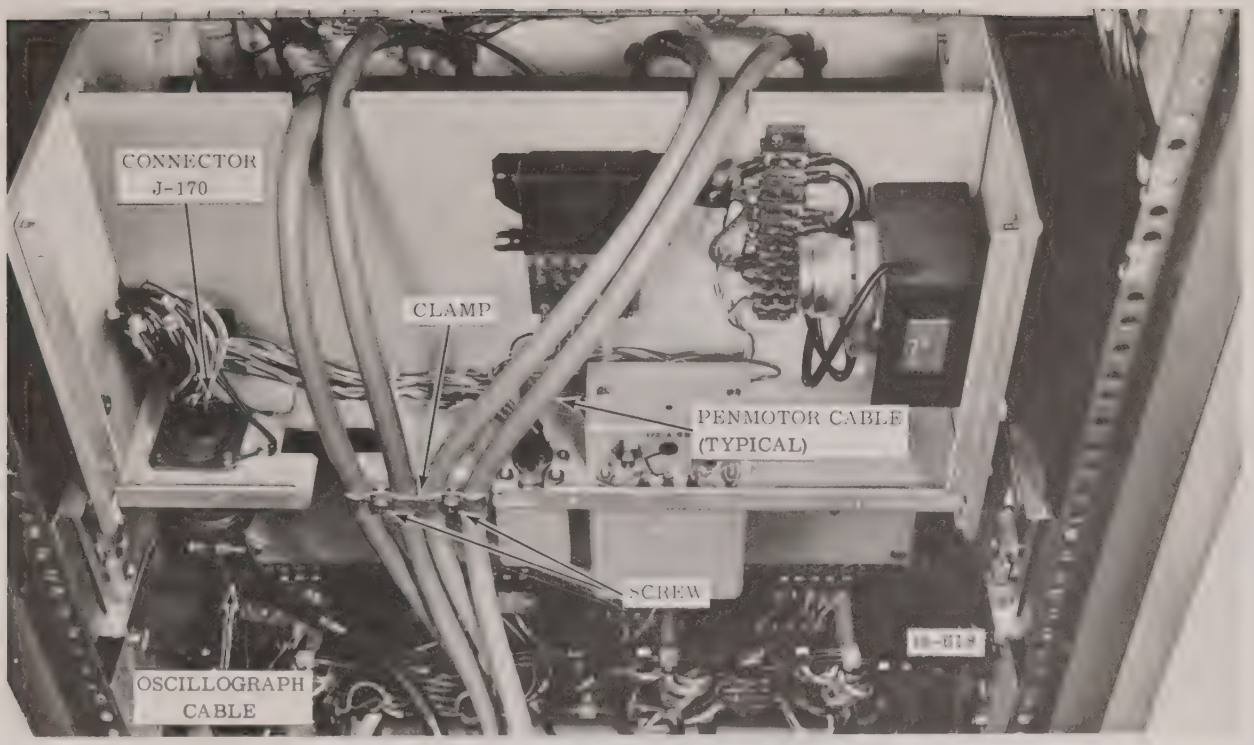


FIGURE 2-3 INSTALLATION OF VERTICAL OSCILLOGRAPH

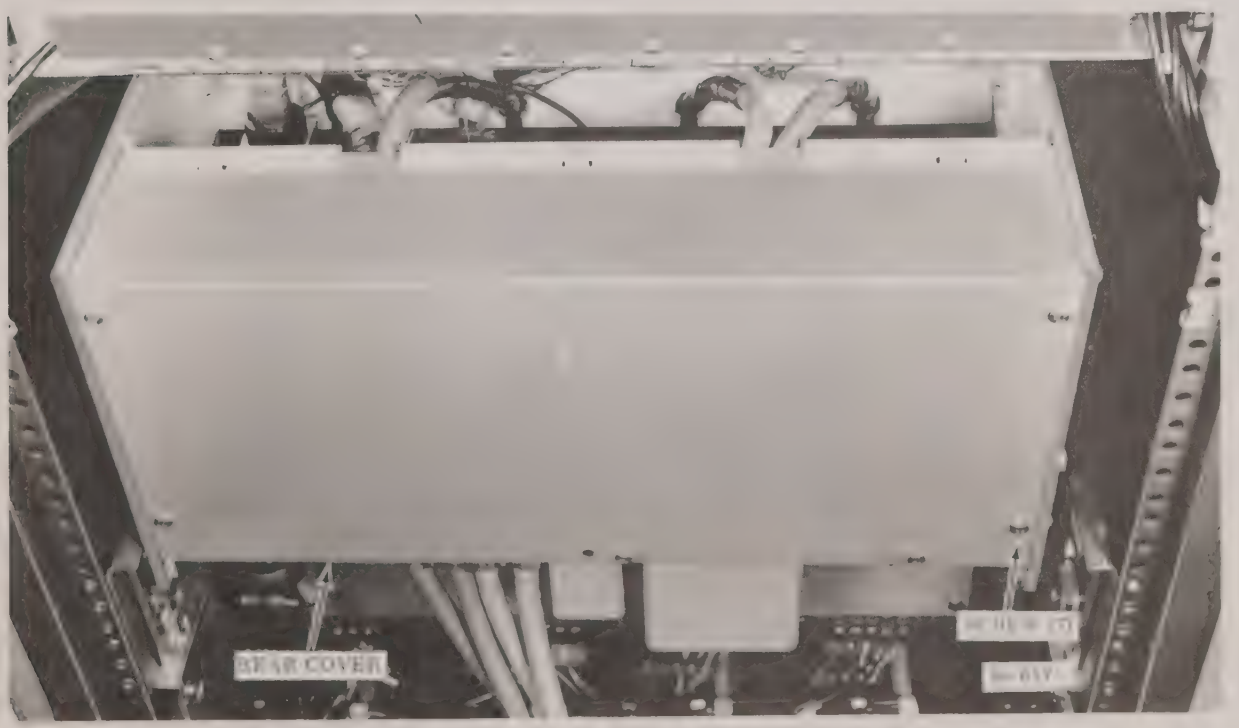
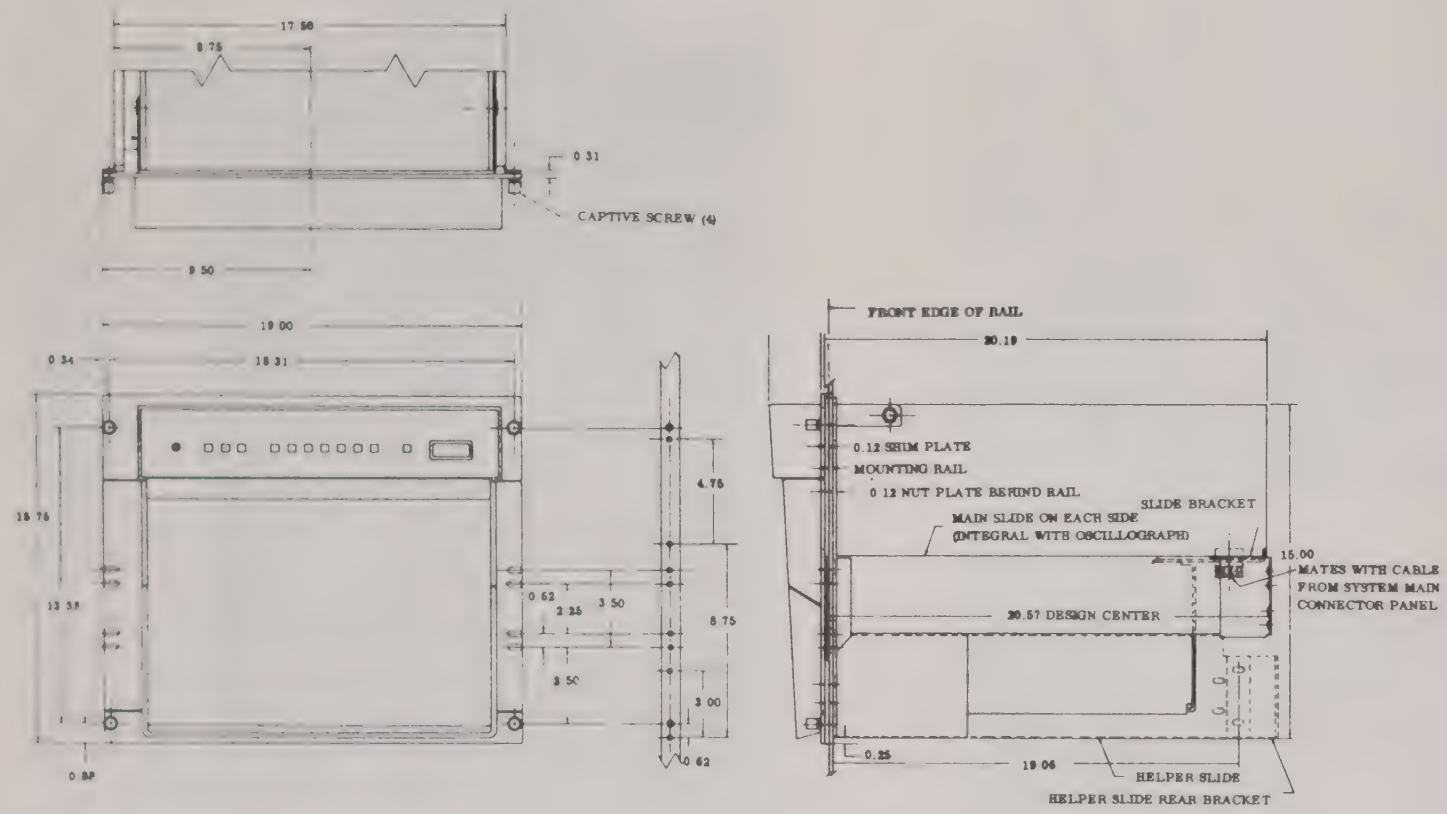


FIGURE 2-4 INSTALLATION OF VERTICAL OSCILLOGRAPH



bi-522

FIGURE 2-5 OUTLINE DIMENSIONS - VERTICAL OSCILLOGRAPH

b. **Horizontal Oscillograph**

1. Position oscillograph on slide brackets and install six screws, lockwashers, and flat washers from underside of oscillograph.

2. Connect rods to control panel on each side of oscillograph. Use a 1/4-inch wrench on square portion of rod and turn clockwise to tighten.

NOTE: Adjust rod so that oscillograph is free to slide when release lever is actuated.

3. Press release levers and slide oscillograph into unit.

4. Plug penmotor cable connectors into penmotors (Fig. 2-7).

5. Connect oscillograph cable connector to J-701 on rear of oscillograph (Fig. 207).

6. Secure penmotor cables to underside of rear cover support bar with two screws and clamps (Fig. 2-7).

7. Position cover plate on rear of oscillograph and install two screws and lockwashers.

8. Press release levers and pull oscillograph out to full open position.

9. Secure penmotor and oscillograph cables to underside of oscillograph with clamp and two screws.

10. Outline dimensions for horizontal oscillograph are shown in Figure 2-8.

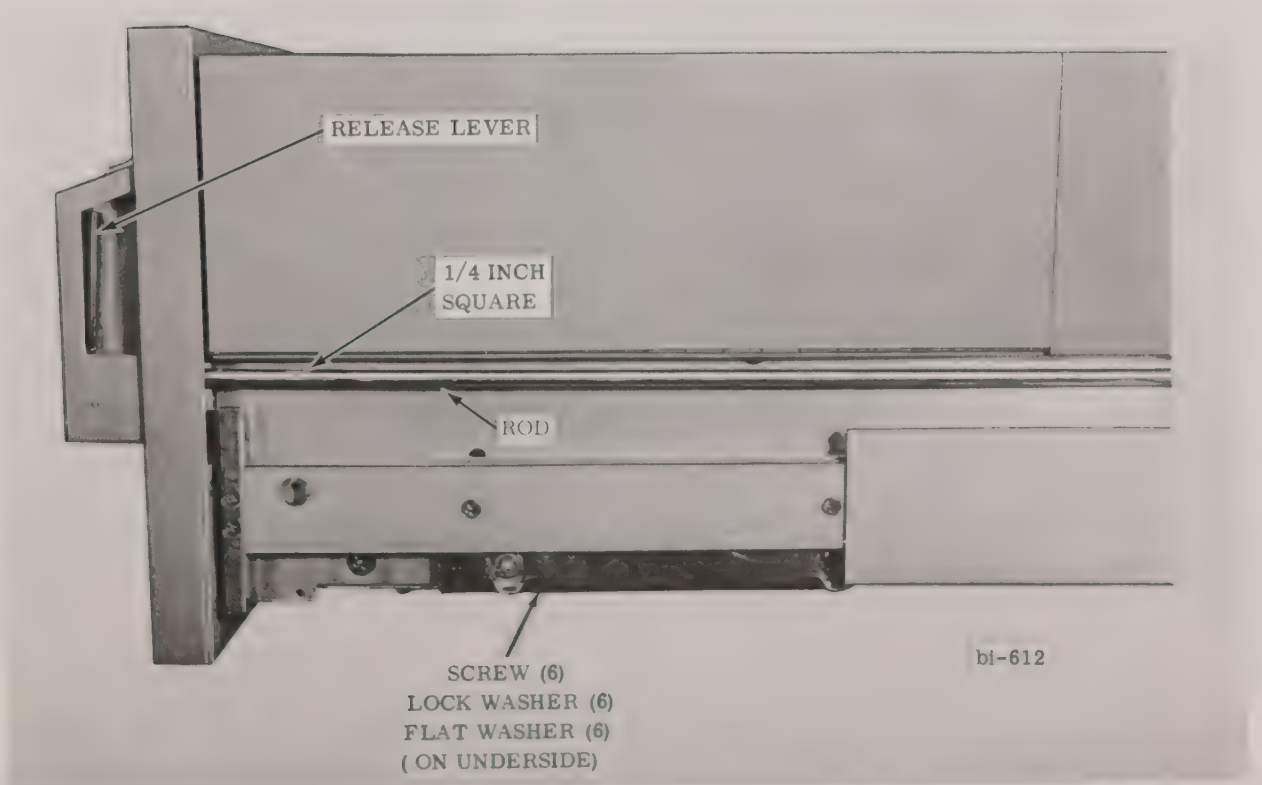


FIGURE 2-6 INSTALLATION OF HORIZONTAL OSCILLOGRAPH

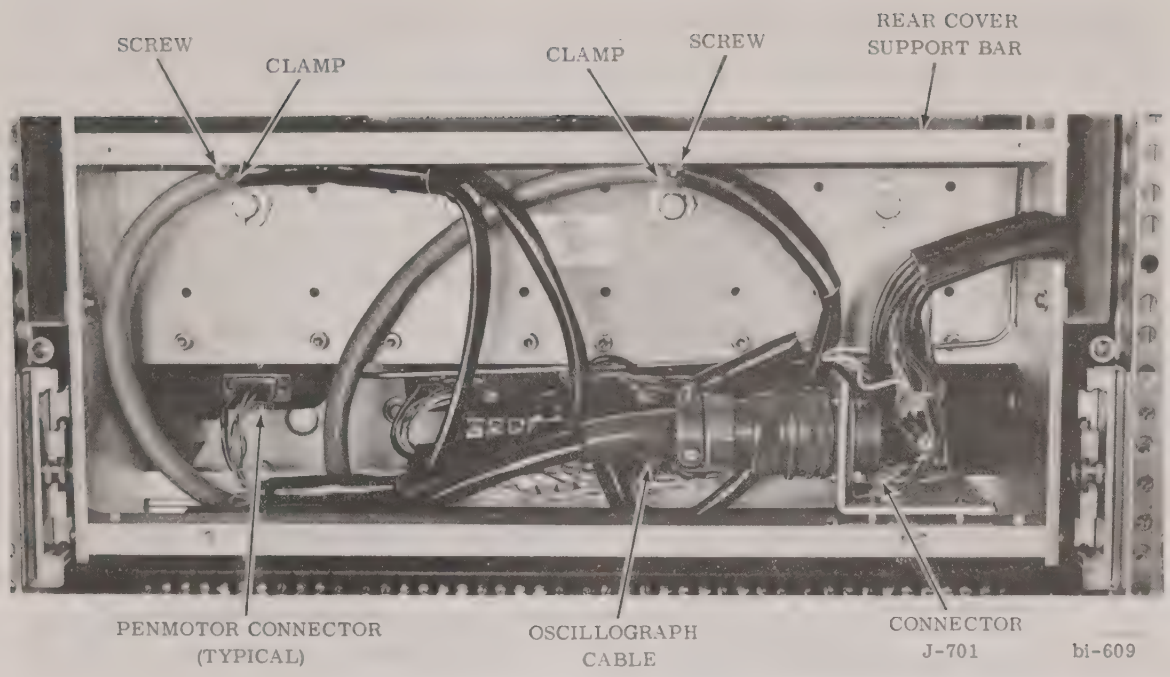


FIGURE 2-7 INSTALLATION OF HORIZONTAL OSCILLOGRAPH

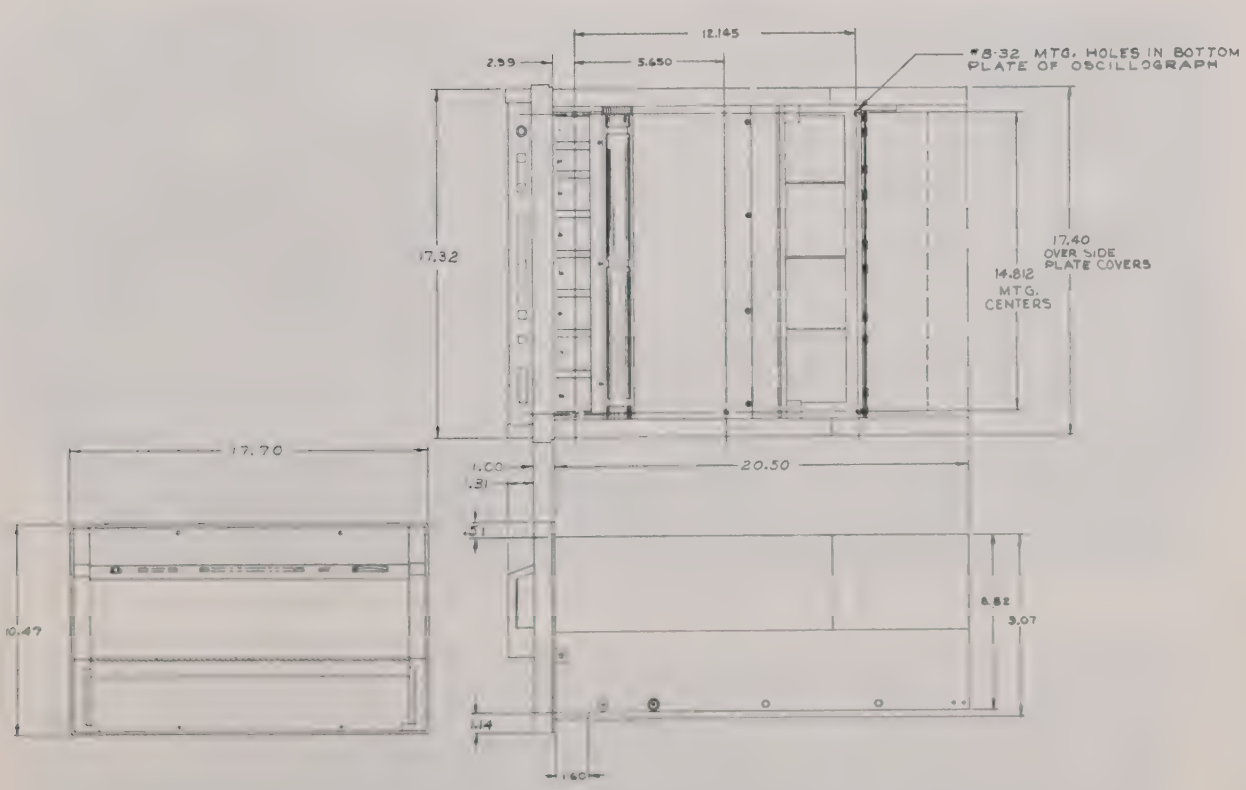


FIGURE 2-8 OUTLINE DIMENSIONS – HORIZONTAL OSCILLOGRAPH

2.5 MAIN CONNECTOR PANEL INSTALLATION

1. Position main connector panel on rear of unit (approximately 10 mounting screw holes from the bottom) and install four screws attaching panel (Fig. 2-9).

NOTE: Circuit Breakers shown in illustration have been replaced by fuses.

2. Attach ground lead to left side of unit.

3. Attach leads to terminals 1 thru 10 on terminal board TB-1 as shown on the applicable schematic (448080 or 483944) for the particular model main connector panel used. Schematics are found in Section VII of this manual.

4. Position cover on terminal board TB-1 and install two screws.

5. Connect oscillograph cable connector to J-701A on main connector panel.

6. Connect power input cable to correct power source.

2.6 SYSTEM POWER PANEL INSTALLATION

1. Slide power switch panel into unit.

NOTE: Feed cable thru opening and down to main connector panel.

2. Secure panel to front of unit with two screws (Fig. 2-10).

3. Attach cable to side of unit with clamp and screw.

4. Refer to Figure 2-11 and connect leads to terminals 1 thru 6 on terminal board TB-1 of main connector panel as shown on the applicable schematic (444120 or 483944) for the particular main connector panel used. Schematics are found in Section VII of this manual.

5. Position cover on TB-1 of main connector panel and install two screws and lockwashers.

6. Connect power input cable to correct power source.

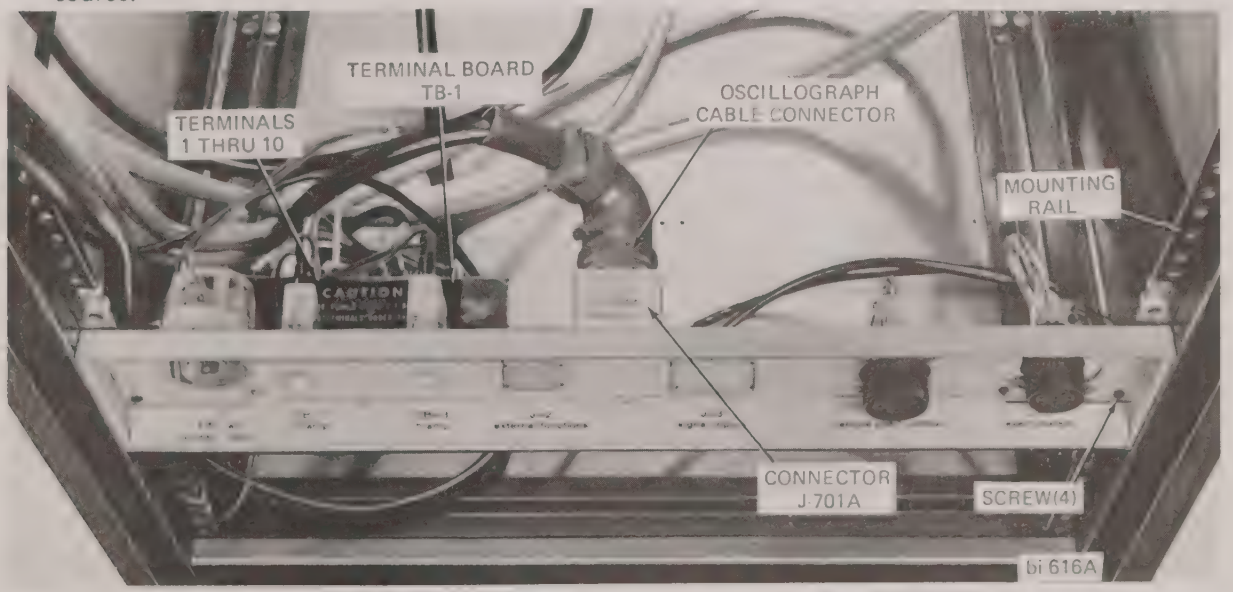


FIGURE 2-9 INSTALLATION OF MAIN CONNECTOR PANEL

FIGURE 2-10 INSTALLATION OF SYSTEM POWER PANEL

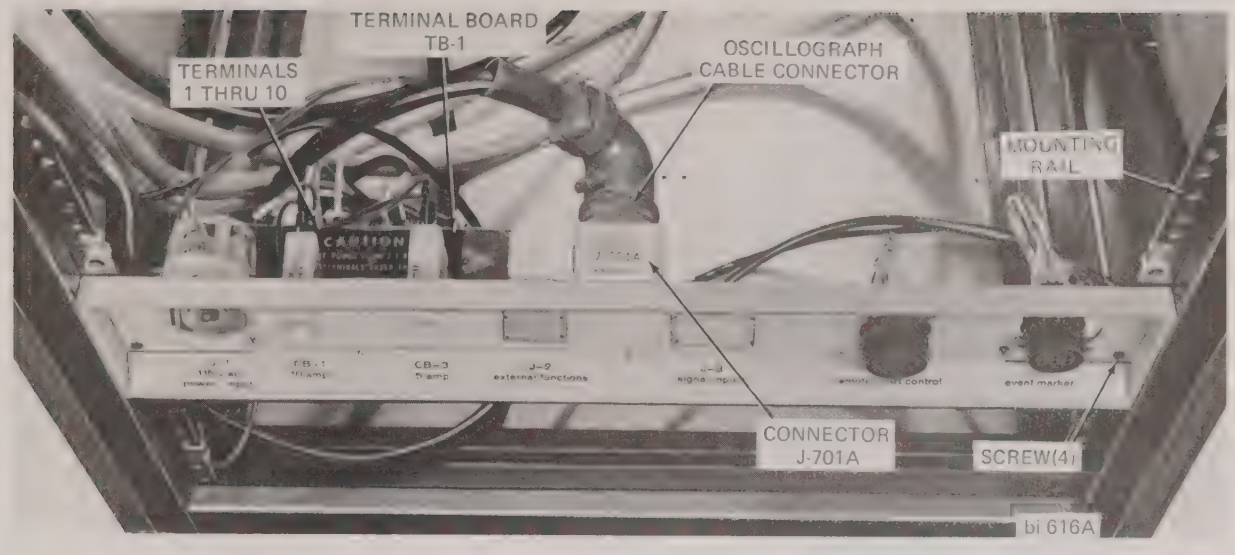


FIGURE 2-11 INSTALLATION OF SYSTEM POWER PANEL

2.7 DRIVE AMPLIFIER FRAME INSTALLATION

a. Mechanical

1. Refer to Figures 2-12 and 2-13.

2. Attach front and rear mtg brackets (items 4 & 5) to slides (item 3). Use hardware supplied with slides.

3. Install slides to cabinet rails using nut bars (item 27) at rear, and spacers and nut bars at front. Use hardware shown in Figure 2-13.

4. Pull inner tracks of slides out from front of cabinet far enough to gain access to 3 slots in each track. (See Fig. 2-13.)

5. Attach Drive Frame Subassy (item 1 or 22) to slides (Fig. 2-13) using screws, items 15 & 19.

6. Insert Drive Amp Boards and Control Timer Board into appropriate slots. Slide entire Drive Amp Frame into cabinet. Secure Drive Amp Frame to cabinet rails using screws (item 8) and nut assemblies (item 14).

7. Install Front Panel (item 2 or 16) to cabinet rails with captive thumb screws on panel and nut assemblies (item 14).

b. Electrical

1. Electrical (signal) connections are made on rear panel of Drive Amp Frame.

WARNING: REMOVE ALL POWER BEFORE MAKING ELECTRICAL CONNECTIONS.

2. Plug power cable assy connector J-101 to P-101. Connect other end of cable to TB-1 on main connector panel as follows:

   Green/yellow lead to terminal 6
   Blue lead to terminal 7
   Brown lead to terminal 8

3. Plug connector P-113 (cable from recorder) to connector J-113.

4. Plug connectors P-203 and P-204 (preamp outputs) to connectors J-103 and J-104.

5. Plug connectors P-105 thru P-112 (from penmotors) to connectors J-105 thru J-112.

6. If system employs separate pen position panel plug connector P-102 to connector J-102.

NOTE: Pen Position Panel (892693-X) is mounted below preamp cage or panel on front of cabinet with 2 screws.

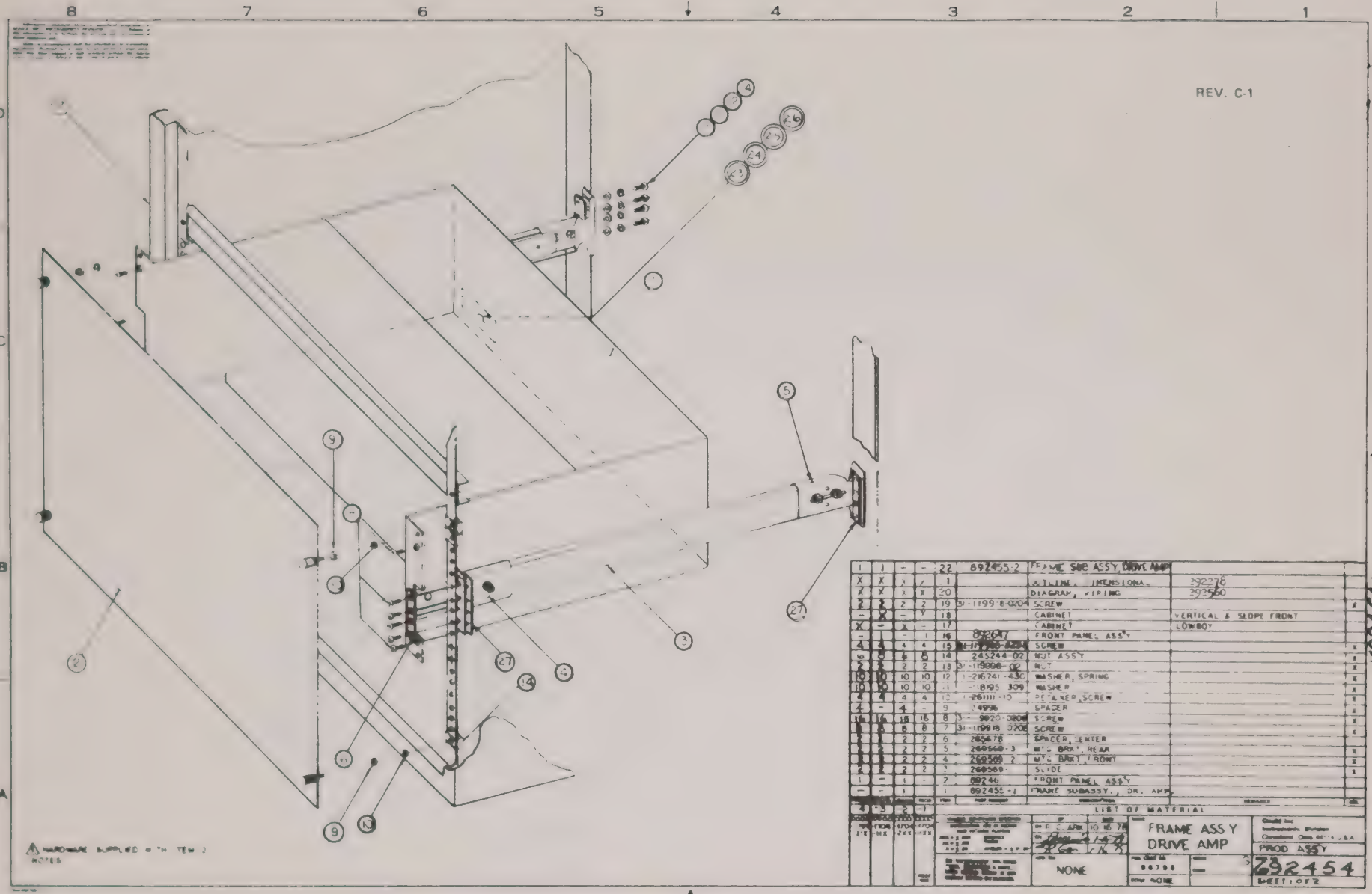


FIGURE 2-12 DRIVE AMP FRAME INSTALLATION

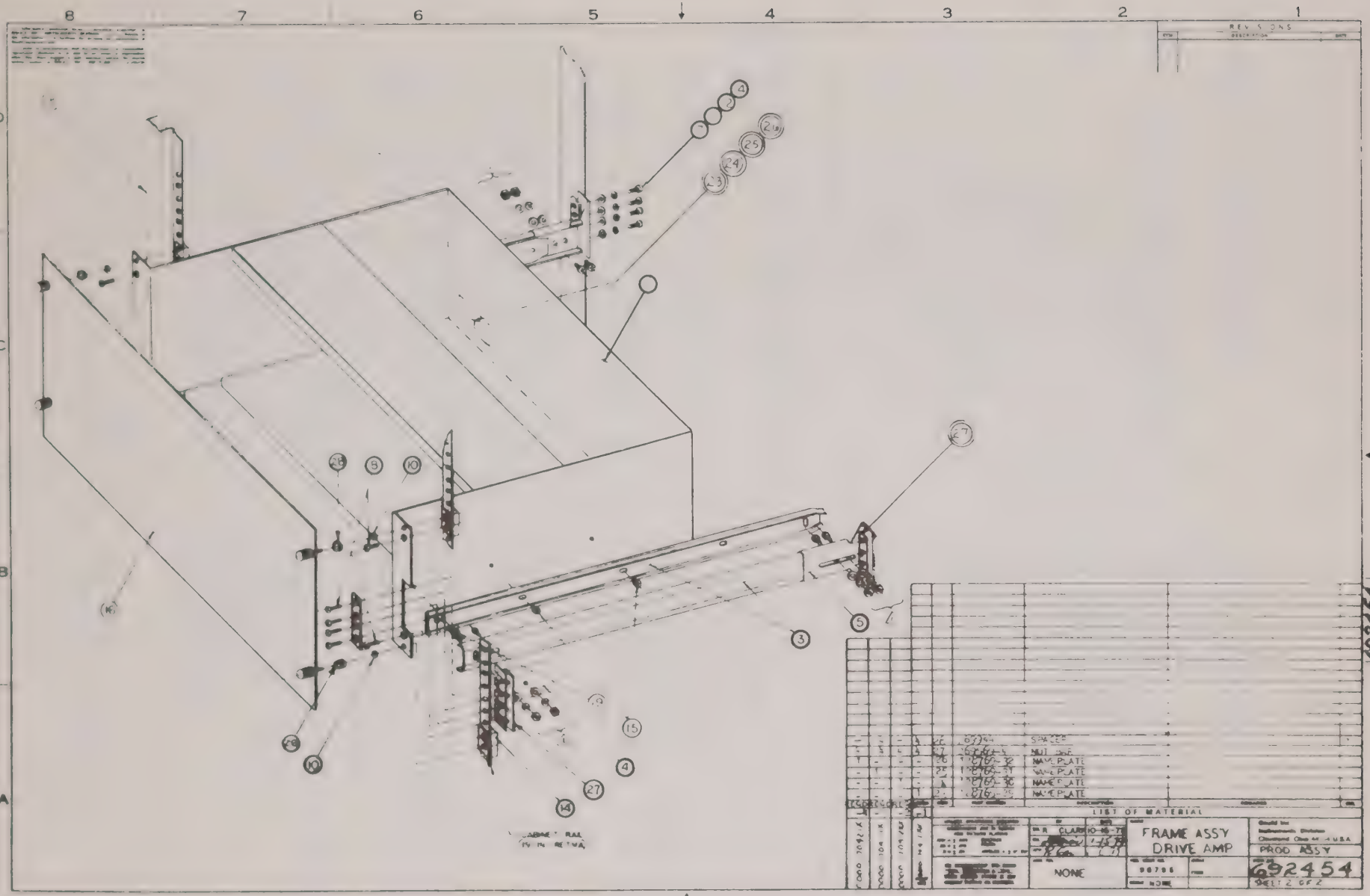


FIGURE 2-13 DRIVE AMP FRAME INSTALLATION

2.8 INSTALLATION OF PREAMPLIFIER PANELS AND CAGES

Installation for the following preamp panels and cages are found in the manuals listed below:

MANUAL NUMBER	MODELS	DESCRIPTION
11-801202-XX	11-1202-15, (-19 & -22)	Preamp Cage Kits
892035	892035	8 Ch Preamp Assy
13-804185-XX	13-4185-10	D.C. Preamplifier
805403-21	0000-5403-21	Amplifier Calibration Unit

2.9 CHART TAKE-UP INSTALLATIONS

a. Model 11-2231-01

NOTE: Take-up kit can be installed in an oscillograph already installed in a rack or cabinet, provided rear of oscillograph is accessible.

1. Open bezel lock and pull paper drawer out as far as possible.

2. Hold spacer behind pulley housing assembly and attach housing assembly to left side of paper drawer with three screws.

CAUTION: Check to be sure straight pin in pulley shaft clears side plate hole when pulley is rotated. Apply locktite to threads of screws and tighten.

3. Refer to Detail A in Figure 2-14 and attach motor and bracket assembly to rear of paper drawer using two screws, flat washers, lock washers and nuts.

4. Install grommet in rear of paper drawer and feed motor leads thru grommet. Place belt over motor and drive pulleys and check belt tension. Adjust belt tension, if required, by loosening three screws on side of motor bracket and positioning motor so center of belt can be depressed approximately 1/2-inch with firm finger pressure (five pound). Tighten screws. (Detail C, Figure 2-14).

5. Remove two countersunk screws from side of paper drawer and remove rod (if installed) extending across bottom of paper drawer (located approximately 6-1/2 inches from front of side plates). Rod and screws will not be used.

6. Remove screw, lockwasher, flat washer and shim securing spring and lever to arm assembly. Insert lever end of arm assembly thru left side plate. Spring side of paper drawer slightly to allow right end of arm assembly to be seated.

7. Place lever and spring over D-shaped shaft and secure using screw, lockwasher, flat washer, and shim removed in step 6.

8. Remove four flat-head screws which attach left slide to paper drawer.

9. Slide center arm of slide back to allow access to JOG switch and take-up switch mounting area.

10. Mount JOG switch to top of paper drawer. (C, Figure 2-14).

11. Thread take-up switch and paper supply sensing leads thru clamp and attach take-up bracket and clamp to side of paper drawer using screws, lockwasher, and flat washers. (C, Figure 2-14).

12. Tighten pivot pin then back off 1/8-turn.

13. Depress take-up bracket and tighten clamp screw. (C, Figure 2-14).

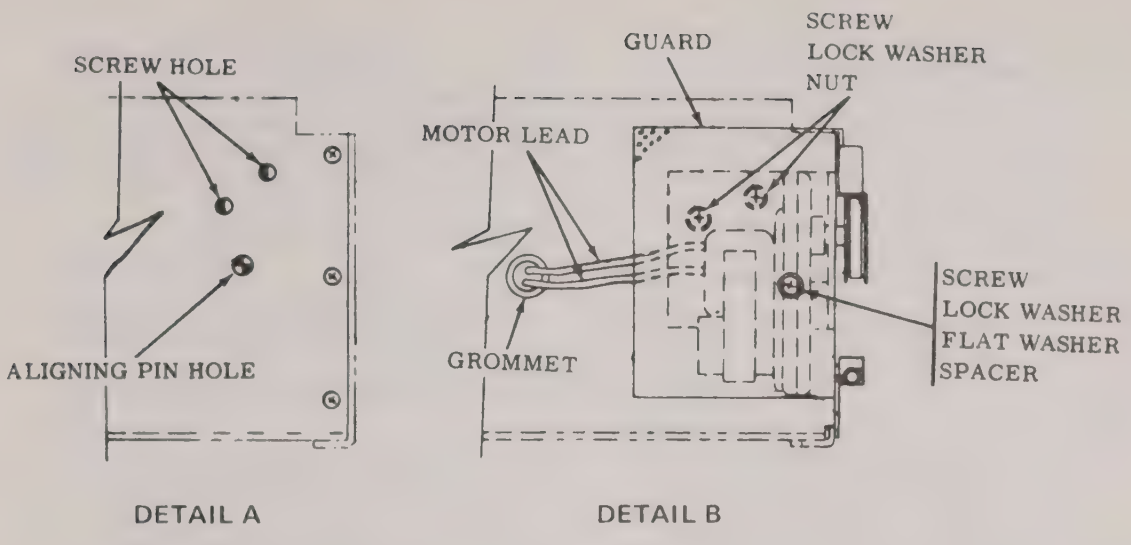
14. Attach left slide to paper drawer using four flat-head screws removed in step 8.

15. Attach motor leads to terminal board TB-703 at terminals 18 and 19.

16. Attach JOG switch leads to terminal board TB-703 as follows:

LEAD (Color)	TERMINAL
Brown/White	16
White/Brown/Yellow	17
White/Red	19 (with motor lead)

17. Install paper core on rewind shaft assembly and install in paper drawer.



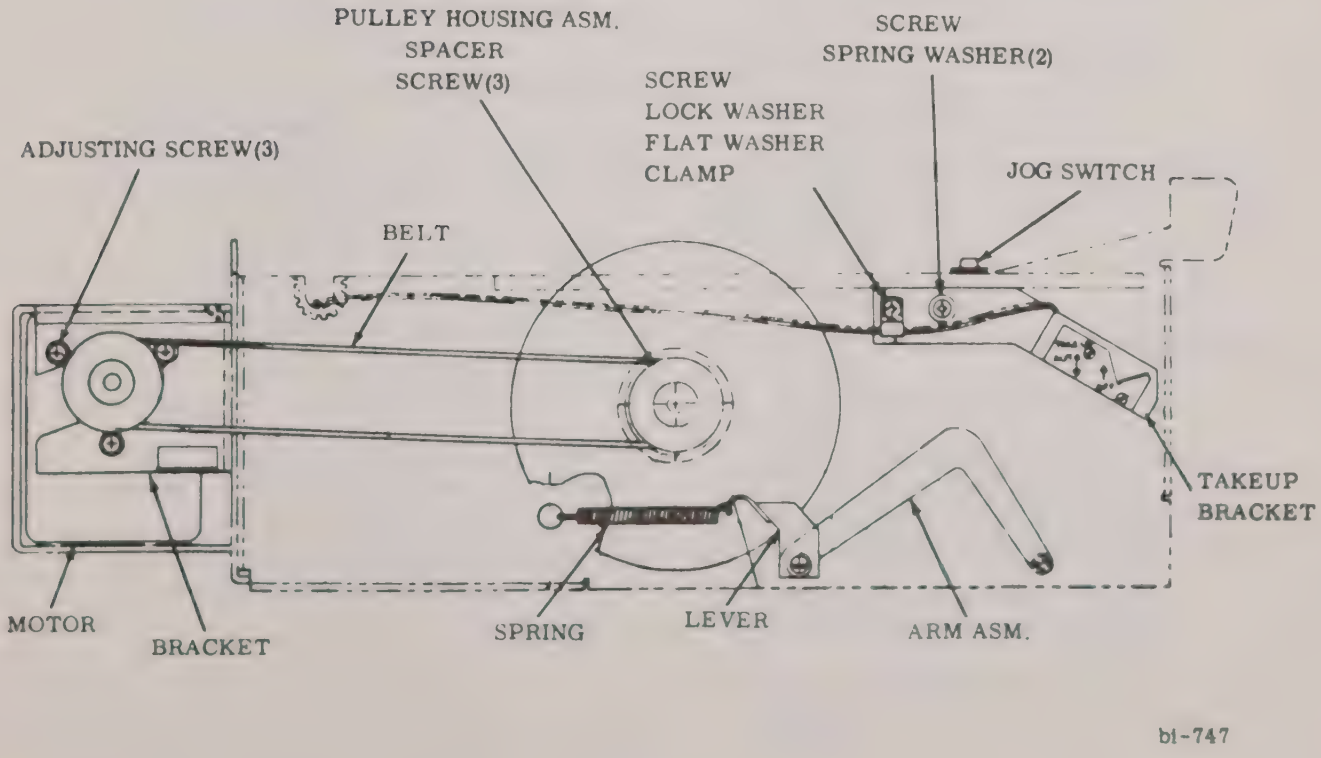


FIGURE 2-14 INSTALLATION OF INTERNAL CHART TAKEUP MODEL 11-2231-01

NOTE: Check to be sure rewind shaft engages straight pin in drive pulley shaft.

b. Models 11-2402-53 & 11-2402-54

The Short Run External Chart Takeup, Model 11-2402-54, and Extended Run External Chart Takeup, Model 11-2402-53, use the following installation procedure. Refer to Figure 2-15.

1. Press both release levers and pull oscillograph out as far as possible
2. Remove two screws from plugs on left and right side of bezel and remove plugs.
3. Remove two screws from top front of control panel.
4. Pull control panel slightly away from bezel, but do not remove.
5. Slide chart takeup supports thru the bezel openings and align notch and holes in supports with holes in oscillograph side plates.

NOTE: Keep cable over top of right support during installation.

6. Secure chart takeup to oscillograph with four screws supplied with takeup.
7. Pull out control panel far enough to gain access to connector.
8. Plug motor assembly connector into connector on inside of control panel.
9. Install control panel and secure with two screws removed in step 3.
10. Place shaft assembly into the support assembly.

NOTE: The following procedure applies only to Model 11-2402-53.

11. Check that paper clears left hub (approximately 1/32 inch clearance is adequate).
12. If the chart paper does not have the proper clearance the left hub must be adjusted to accommodate the paper as follows:
    a. Loosen two set screws in the spring stop.

NOTE: DO NOT Loosen set screws in stop.

    b. Grasp the left hub firmly and rotate the stop and shaft until the hole in the collar of the left hub is aligned with the set screw.
    c. Loosen set screw with an Allen wrench and leave wrench in position.
    d. Rotate the stop and shaft until the proper adjustment is reached. (Clockwise moves the hub to the left right; counterclockwise moves the hub to the left.
    e. Tighten set screw and remove wrench.
    f. Tighten set screws in spring stop.
13. Remove hub and shaft assembly from unit.
14. Place paper core onto shaft and twist paper core counterclockwise until core is against hub.
15. Place right hub onto shaft and twist screw until core is against hub.
16. Position assembly on chart takeup.
17. Check paper clearance at right hub (approximately 1/32 inch clearance is adequate).
18. If adjustment is necessary, grasp the paper core and twist the right hub screw until the proper clearance is obtained.
19. Attach the chart paper to the core.

c. Model 11-2402-52

The external chart takeup kit 11-2402-52 is installed with the following procedure and is shown in Figure 2-16.

1. Turn off instrument.
2. Release bezel lock and pull out writing drawer.
3. Remove two set screws from pulley.
4. Install teflon pulley onto pulley hub.
5. Align holes in teflon pulley with holes in hub and install two set screws supplied with kit.
6. Attach takeup arm to front panel with two filister-head screws supplied with kit.
7. Align right takeup arm with two holes in front panel and attach with two flat-head screws.
8. Stretch spring belt, attached to left arm assembly, over teflon pulley.

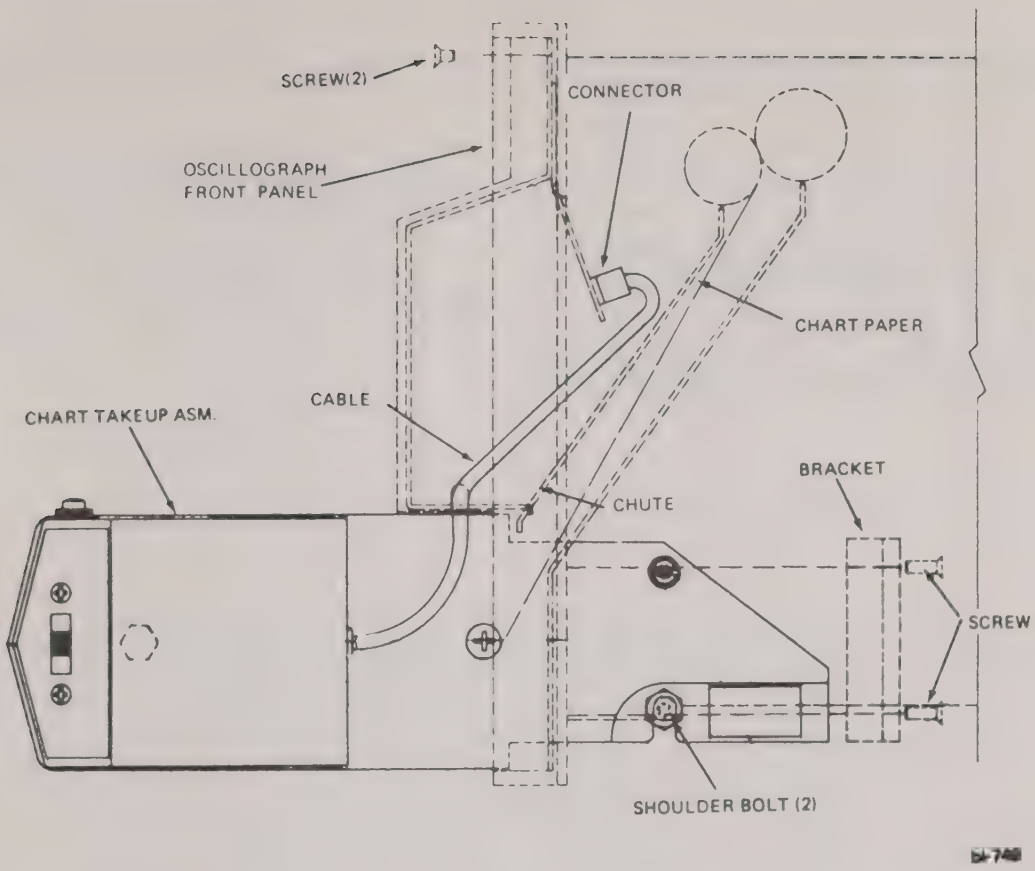


FIGURE 2-15 INSTALLATION OF TAKE-UP KIT MODELS 11-2402-53 and 11-2402-54

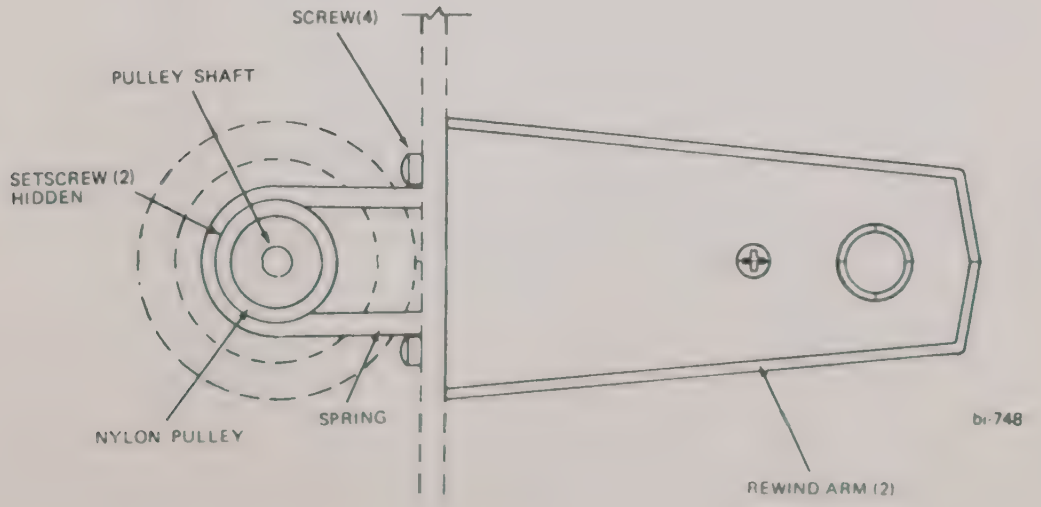


FIGURE 2-16 INSTALLATION OF TAKE-UP MODEL 11-2402-52

9. Pull out spring loaded locking knob on left arm assembly.

10. Place takeup shaft between arm assemblies and lock into position by rotating shaft to align with pins on locking knob and release knob.

11. Slide writing drawer into unit and engage bezel lock.

12. Run thru enough paper to start paper around takeup shaft. Be certain paper is snug around shaft.

NOTE: Do not attach paper to takeup shaft with tape or other adhesive.

2.10 INTERCHANNEL EVENT MARKER INSTALLATION

Installation instructions for 7 Interchannel Event Marker Kit found on drawing 692792 in Section VII.

SECTION III

OPERATION

3.1 GENERAL

This section describes and illustrates the operation of the Gould 200 recording system and its various components. It also contains instructions for preliminary checks of the system prior to normal operation.

3.2 PREAMPLIFIERS, & PREAMP PANELS

The preamplifier panel or preamplifiers used in the 1704 system are all solid state unit designed to combine compactness with extreme fidelity, stability and input security. Controls are simple, easy to see, and positive in settings. A complete description of the preamplifier(s) used in this particular system is contained in the preamplifier manual behind this manual.

3.3 OSCILLOGRAPH CONTROL DESCRIPTION

a. Vertical Oscillograph

The circled numbers in Figure 3-1 (1 thru 6) correspond with the items listed on the following page. Item 7 is located inside the oscillograph and described only.

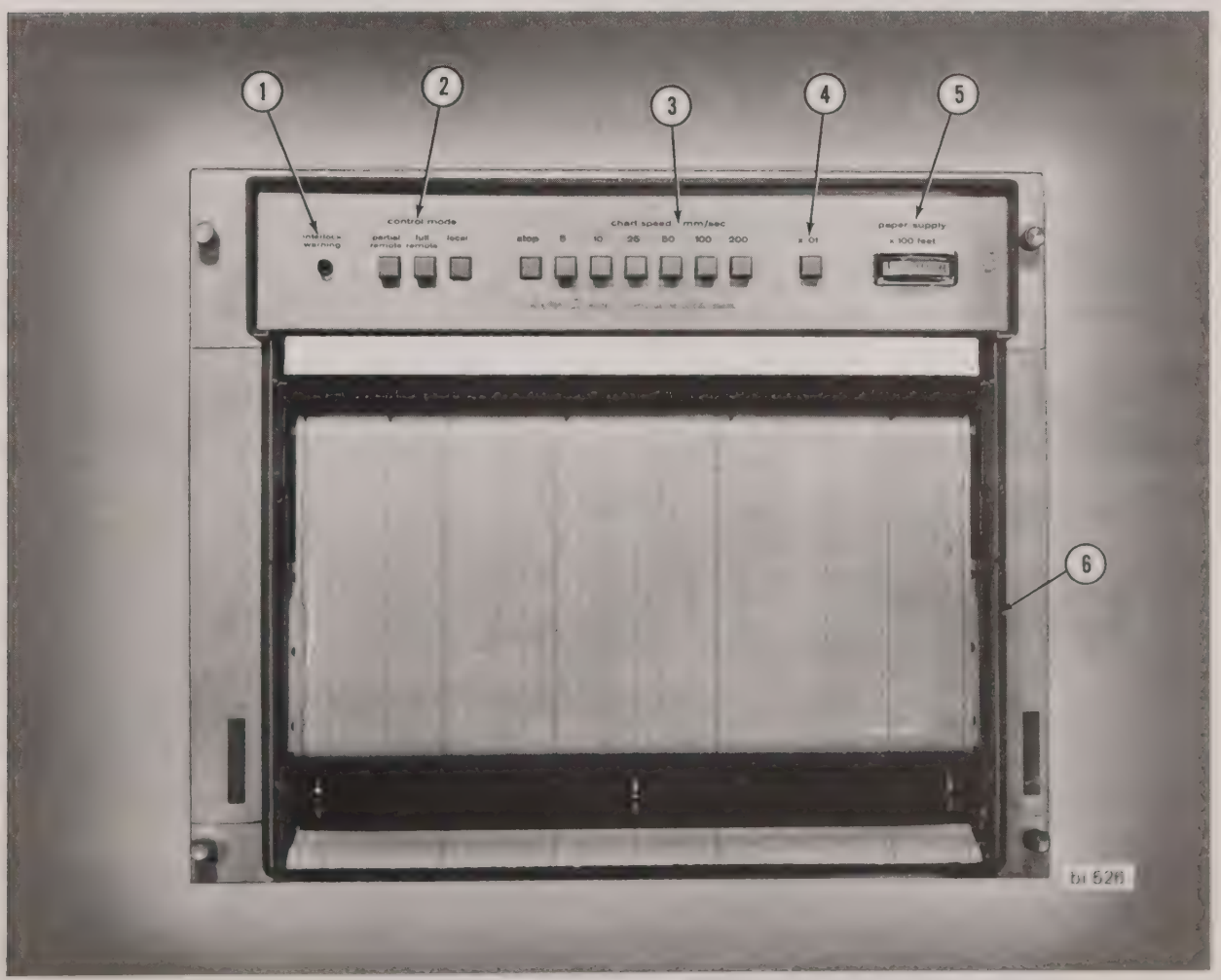


FIGURE 3-1 VERTICAL OSCILLOGRAPH FRONT PANEL CONTROLS

1 Interlock Warning Light . . . . . The interlock warning light is controlled by an interlock switch located in the paper supply drawer. When warning light is illuminated, it indicates an open interlock switch due to an empty paper supply roll or the bezel lock not being engaged.

NOTE: The oscillograph will not operate when the warning light is illuminated.

2 Control Mode . . . . . The control mode is a three-position switch with the following functions:

a. Partial Remote — When PARTIAL REMOTE button is depressed, chart drive ON—OFF control is transferred to a remote location thru connector J-4. Chart speed control remains at the oscillograph.

b. Full Remote — When FULL REMOTE button is depressed, all chart speed control is transferred to the remote location thru J-4.

c. Local — When LOCAL button is depressed, full control is at the oscillograph.

3 Chart Speed mm/sec . . . . . The chart speed mm/sec is a seven-position switch with the following functions:

a. Stop Button — Depressing STOP button stops chart drive operation and turns off power to pens.

b. Chart Speed Buttons — One for each speed, marked 5, 10, 25, 50, 100 and 200 mm/sec. Button depressed indicates chart drive speed.

NOTE: Depressing any of the chart speed buttons releases the STOP button and turns on chart drive motor.

4 X.01 Button . . . . . When X.01 button is depressed, chart speeds of 5, 10, 25, 50, 100, and 200 mm/sec are multiplied by .01 and become .05, .1, .25, .5, 1 and 2 mm/sec.

5 Paper Supply X100 Feet . . . . . The paper supply X100 feet indicator provides a quick reading of the amount of paper remaining on supply roll shaft. The dial is in increments from zero to 1000 feet and is set by means of an adjusting screw on right side of oscillograph.

6 Bezel Lock . . . . . The Bezel Lock locks the paper supply drawer into the oscillograph. It is attached to the writing bar and pressure roller. The oscillograph will not operate unless the bezel lock is in closed position.

7 Event Marker Switches . . . . . The two five-position event marker switches, which are mounted inside the oscillograph, function as follows:

a. 1 Sec – When switch is in 1 SEC position, pen deflects in one direction every second and in the opposite direction every tenth second.

b. 10 Sec – When switch is in 10 SEC position, pen deflects in one direction every 10 seconds.

c. Off – When switch is in OFF position, event marker does not operate.

d. Ext – When switch is in EXT position, event marker is connected to terminals on connector J-5 on rear panel so that external marker signals may be used.

e. Aux –

1. With L.H. Timer switch in "AUX" position, and control board timer switch "ON", timer pulses will be directed to L.H. event marker, Left deflection only.

2. With L.H. or R.H. Timer Switch in "AUX" position and timer switch "OFF", an external TTL input to connector J-114 of drive amp frame will cause the L.H. and R.H. event markers to deflect as follows: J-114 +TTL to pin 1, L.H. Marker, Left Deflection. +TTL to pin 2, R.H. Marker, Right Deflection. Common to pin 3.

b. Horizontal Oscillograph

The circled numbers in Figure 3-2 (1 thru 7) correspond with the items listed on the following page.

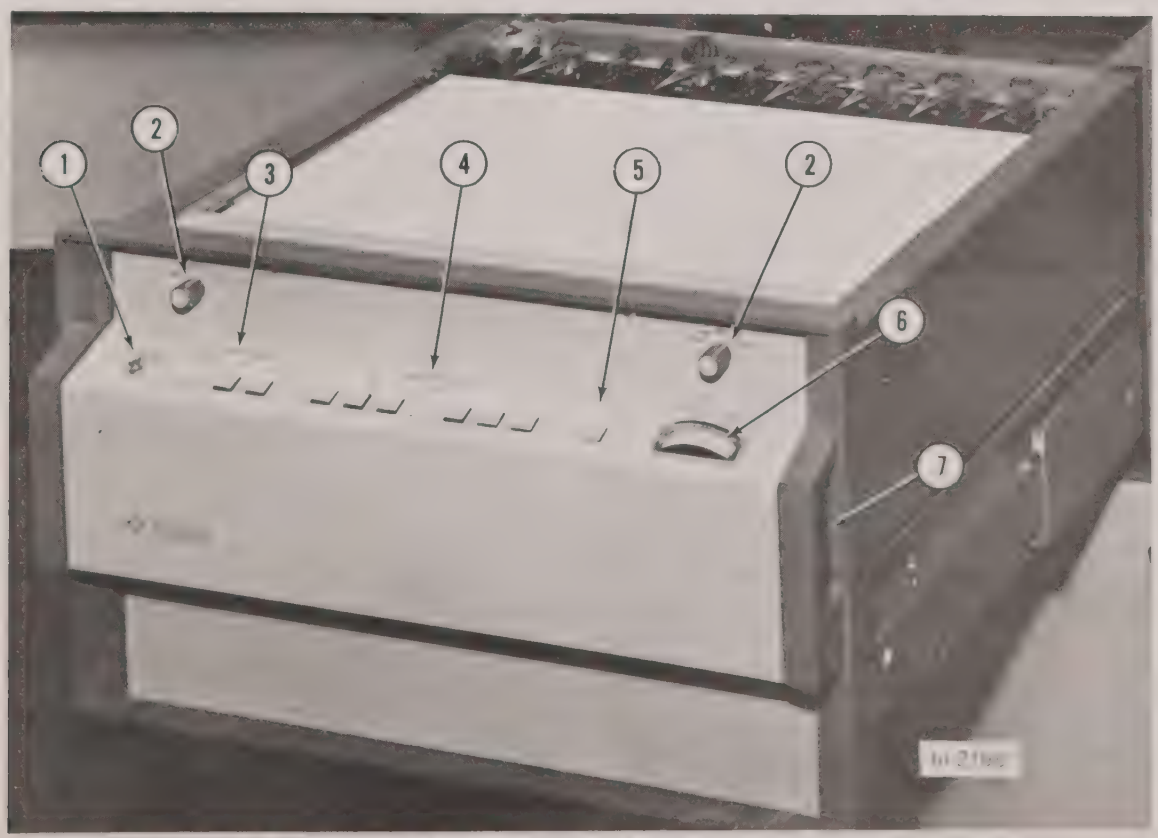


FIGURE 3-2 HORIZONTAL OSCILLOGRAPH CONTROL PANEL CONTROLS

1 Interlock Warning Light . . . . . .

The interlock warning light is controlled by two switches; one located beneath the writing table and the other located on the paper supply arm assembly. When warning light is illuminated, it indicates that one, or both, of the interlock switches are open due to an empty paper supply roll or the writing table not locked in position.

NOTE: The oscillograph will not operate when the warning light is illuminated.

2 Event Marker Switches . . . . . .

The two five-position event marker switches function as follows:

a. 1 Sec – When switch is in 1 SEC position, pen deflects to the left every second and to the right every ten seconds.

b. 10 Sec – When switch is in 10 SEC position, pen deflects to the right every 10 seconds.

NOTE: The ten second interval may be changed to 20, 30 or 60 seconds by an internal adjustment of the standard "multi-choice" timer. Refer to Paragraph in Section VI, Maintenance Section, for setting timer instructions.

c. Off – When switch is in OFF position, event marker does not operate.

d. Ext – When switch is in EXT position both coils of event markers are connected to terminals on connector J-2 on main connector panel so that external marker signals may be used.

e. AUX – Refer to "Event Marker Switches" 7 e., on Page 3.3.

3 Control Mode . . . . . .
(Buttons illuminate when pushed)

The control mode is selected by a three-position switch with the following functions:

a. Partial Remote – When PARTIAL REMOTE button is depressed, chart drive ON–OFF control is transferred to a remote location thru connector J-4 on main connector panel. Chart speed control remains at the oscillograph.

b. Full Remote – When FULL REMOTE button is depressed, all chart speed control is transferred to the remote location thru connector J-4 on main connector panel.

c. Local – When LOCAL button is depressed, full control is at the oscillograph.

4	Chart Speed mm/sec . . . . . (Buttons illuminate when pushed)	The chart speed is selected by a seven-position switch with the following functions: a. Stop Button – Depressing STOP button stops chart drive operation and turns off power to pens. b. Chart Speed Buttons – One for each speed, marked 5, 10, 25, 50, 100 and 200. Button depressed indicates chart drive speed. **NOTE: Depressing any of the chart speed buttons releases the STOP button and turns on chart drive motor.**
5	X.01 Button . . . . . (Illuminates in the .01 position)	When X.01 button is depressed, chart speeds of 5, 10, 25, 50, 100 and 200 mm/sec are multiplied by .01 and become .05,.1, .25, .5,1 and 2 mm/sec.
6	Paper Supply X100 Feet	The paper supply X100 feet indicator provides a quick reading of the amount of paper remaining on supply roll shaft. The dial is in increments from zero to 1000 feet and is set by means of an adjusting screw on right side of oscillograph.
7	Release Lever . . . . . (one each side)	Hand release levers. Allows Oscillograph to be slide out of enclosure when depressed.

3.4 OSCILLOGRAPH OPERATION CHECK

NOTE: Oscillograph may be tested outside of unit.

a. **Front Panel Pushbuttons**

1. PARTIAL REMOTE MODE. Jumpering pins R and S on oscillograph cable connector J-701 should move chart paper at a pre-selected speed.

2. FULL REMOTE MODE. Apply +28 volts from pin R of J-701 to remote functions as brought out to pins on J-701 (refer to wiring diagrams 292585 or 292781 in Section VII). All chart speed control is transferred to a remote location.

3. LOCAL. Pressing local pushbutton allows full control of unit at oscillograph control panel.

4. CHART SPEED. Check to see that oscillograph operates at all speeds.

b. **Event Marker Switch**

Each event marker position should produce the following results:

1. EXTERNAL. This position connects event marker to external inputs on J-701. Applying 28-volts DC to input terminals will energize corresponding event marker (refer to wiring diagram 292585 or 292781).

2. OFF. This position turns off event marker.

3. 10. This position produces one event marker pulse to the right every 10 seconds.

4. 1. This position produces one event marker pulse per second. Nine left and one right every tenth second.

5. AUX – Refer to "Event Marker Switches" 7 e., on Page 3.3.

c. Interlock Warning Light

If unit runs out of paper or bezel is opened, light goes on and chart drive stops.

NOTE: It is permissible for interlock light to flicker on momentarily when stop button is released. Warning light will not go on when chart speed is in stop position.

3.5 PRELIMINARY OPERATION

a. General

This paragraph contains instructions for preliminary operation with the system in various configurations. Be sure to use the instructions that apply to this system.

b. Operation of System with 13-4185-10 Series Preamplifier (Pushbutton Model)

1. Be sure POWER on-off switch is in OFF position.
2. Press STOP button on oscillograph control panel.
3. Make sure power input cable is attached to connector TB-1 on main connector panel and other end connected to a power source of 105-125 volts.
4. Make sure signal input cable is attached to connector J-3 on main connector panel.
5. Connect the external function cable to connector J-2 on the main connector panel.
6. Loosen locking knobs on SENSITIVITY X1 controls and rotate controls to their full clockwise (detent) position.
7. Place all POLARITY switches in N (normal) position, if applicable.
8. Press all attenuator OFF buttons.
9. Depress LOCAL button in control mode group on oscilloscope control panel.
10. Depress POWER on-off switch to turn on instrument.
11. Allow the unit fifteen minutes to warm up to permit the amplifiers to stabilize.
12. Press ZERO button located in recorder group on preamplifier.

NOTE: All pens should locate at chart center. If they do not, center pens with PEN POSITION controls.

13. Depress X.01 button on oscillograph and select a chart speed of 100 or 200 millimeters per second.

NOTE: This will move chart at one or two millimeters per second.

14. Press CHECK button located in recorder group. All pens should deflect exactly 25 chart divisions to the left from a built-in calibration source.

NOTE: If no deflection is obtained, the CAL switch located on rear panel of the preamplifier may be in EXT (external) position. Remove back cover from unit and make certain switch is in INT (internal) position.

15. If CAL switch is in INT position and 25 divisions of required accuracy is not obtained, refer to Section VII for drive amplifier calibration and the preamplifier manual for calibration.
16. Press ZERO button to return pens to chart center.
17. Press and hold IDENTIFY button and consecutively press volts/division buttons starting at. .05. Pen should deflect 2 chart divisions for each attenuator step. Pens will return to zero when IDENTIFY button is released.
18. Press RECORD button, adjust pen to desired zero base line, and select desired volts/division setting.

Unit is now ready for operation.

c. Operation of System with 4600 Series Preamplifier

NOTE: Be sure to read the operating instructions in the preamplifier manual.

1. Perform steps 1 thru 3 in step b above.
2. Attach signal input cables to preamplifiers. (Round holes on preamp cage.)

CAUTION: Refer to the signal connection procedure in the preamplifier manual to make sure proper connections are made. Failure to do this can result in damage to the instrument.

3. Turn the preamplifier ATTENUATOR (VFS, etc.) controls to the OFF position.

4. Depress POWER on-off switch to turn on instrument.

5. Depress LOCAL button on oscillograph control panel.

6. Depress X.01 button on oscillograph control panel and select a chart speed of 100 or 200 millimeters per second.

NOTE: This will move chart at one or two millimeters per second.

7. Center pens with PEN POSITION controls located on pen position panel or drive amp frame.

8. Check to see that PEN POSITION control allows pen to traverse full chart width.

Unit is now ready for operation.

e. Operation of System with Eight Channel Preamplifier Assembly – 892035.

1. Perform steps 1 thru 4 in step b above.

2. Turn the SENSITIVITY X1 controls to their full clockwise (detent) position.

3. Turn VOLTS FULL SCALE controls to OFF positions.

4. Depress LOCAL button on oscillograph.

5. Depress POWER on-off switch to turn on instrument.

6. Depress X.01 button on oscillograph and select a chart speed of 100 or 200 millimeters per second.

NOTE: This will move chart at one or two millimeters per second.

7. Apply known voltage to preamplifier input and increase SENSITIVITY control setting to obtain pen deflection near full scale on chart paper. Pen deflection should equal SENSITIVITY control setting.

8. Repeat step 7 for each channel.

Unit is now ready for operation.

f. Operation of System with Amplifier Calibration and System Power Assembly

NOTE: The amplifier calibration unit is used with 4600 series preamplifiers. Be sure to read the operating instructions for the preamplifier.

1. Be sure POWER on-off switch is in OFF position.

2. Press STOP button on oscillograph control panel.

3. Make sure power input cable is attached to connector J-1 on main connector panel and other end connected to a power source of 105-125 volts.

4. Make sure signal input cables are attached to preamplifier inputs.

CAUTION: Refer to the signal connection procedure in the 4600 series preamplifier manual to make sure proper connections are made. Failure to do this can result in the damage to the instrument.

5. Depress POWER on-off switch to turn on instrument.

6. Depress LOCAL button of control mode group on oscillograph control panel.

7. Depress X.01 button on oscillograph and select a chart speed of 100 or 200 millimeters per second.

NOTE: This will move chart at one or two millimeters per second.

8. Center pens with PEN POSITION controls located on pen position panel or drive amp frame.

9. Select a channel by depressing one of the CHANNEL SELECTOR buttons on the amplifier calibration unit.

10. Recenter pen, if necessary, in channel selected with PEN CENTERING control on amplifier calibration unit.

11. Depress the CAL SIGNAL switch marked -25. Pen should deflect 25 divisions to the left.

12. Depress CTR button in CAL SIGNAL switch. Pen should return to chart center.

13. Depress CAL SIGNAL switch marked +25. Pen should deflect 25 divisions to right.

14. Repeat the above procedure for each channel.

System is now ready for operation.

3.6 CHART TAKE-UP OPERATION

The power switch may be placed in the HIGH or LOW position. This switch allows the chart take-up to operate when any one of the chart speed buttons is depressed.

a. When starting a rewind, the power switch should be in the LOW position. When the rewound roll approaches approximately four inches in diameter, the power switch can be placed in the HIGH position.

b. The takeup is capable of rewinding a full roll of chart paper with the power switch in the LOW position, however, the roll will become loose as it approaches its maximum diameter.

c. If a new rewind is started with the power switch in the HIGH position, the takeup may override the oscillograph and pull the paper through it, causing distortions in the recording. in the event this happens, the power switch should be placed in the LOW position.

The pushbutton switch operates the chart takeup when power is ON to the oscillograph.

When the chart paper is to be reviewed, place the power switch in the OFF position. This will render the chart takeup inoperative but the oscillograph will still pay out chart paper. When the reviewing has been completed, press the pushbutton switch and the chart takeup will reel in all the slack.

3.7 TIMER SETTING

The timer actuates left event markers at programmed repetition rates. Selection of repetition rates is made via switch S-104 on the control timer board located in the drive amp frame. Set rate as follows:

1. Turn oscillograph power OFF.

2. Loosen the two screws which secure the control board and pull out of the drive amp frame.

3. Set switch positions for desired repetition rate per Table 3-1.

NOTE: Use switch positions for line frequency recorder operates on.

4. Replace control board and secure with screws.

5. Turn oscillograph power ON.

6. Turn TIMER switch ON. Timer ready for operation.

TABLE 3-1. SWITCH SETTINGS VS TIMER REPETITION RATE FOR VARIOUS POWER LINE FREQUENCIES

REPETITION RATE	60 HZ LINE		50 HZ LINE		400 HZ LINE	
	SW ON	SW OFF	SW ON	SW OFF	SW ON	SW OFF
0.1 SECOND	2, 3, 5	1, 4, 6, 7, 8	1, 3, 5	2, 4, 6, 7, 8	3, 6	1, 2, 4, 5, 7, 8
1.0 SECOND	2, 3, 6	1, 4, 5, 7, 8	1, 3, 6	2, 4, 5, 7, 8	3, 7	1, 2, 4, 5, 6, 8
10.0 SECONDS	2, 3, 7	1, 4, 5, 6, 8	1, 3, 7	2, 4, 5, 6, 8	3, 8	1, 2, 4, 5, 6, 7
100.0 SECONDS	2, 3, 8	1, 4, 5, 6, 7	1, 3, 8	2, 4, 5, 6, 7	--	--
0.01 MINUTE	2, 4, 6	1, 3, 5, 7, 8	1, 4, 6	2, 3, 5, 7, 8	4, 7	1, 2, 3, 5, 6, 8
0.10 MINUTE	2, 4, 7	1, 3, 5, 6, 8	1, 4, 7	2, 3, 5, 6, 8	4, 8	1, 2, 3, 5, 6, 7
1.00 MINUTE	2, 4, 8	1, 3, 5, 6, 7	1, 4, 8	2, 3, 5, 6, 7	--	--

SECTION IV

FAULT LOCATION TABLES

4.1 SCOPE

This section contains two fault location tables. The tables are intended to define common problems and/or malfunctions encountered during operation and suggest the appropriate remedies to satisfy them. Should the fault not be covered here, and beyond the scope of this manual, contact your nearest Gould Service Center listed on the warranty sheet in this manual.

TABLE 4-1 GENERAL SYSTEM FAULT LOCATION

FAULT	CAUSE	REMEDY
1. Recorder inoperative.	a. Power cable not connected.	a. Connect power cable.
	b. Blown fuse, Main Connector Panel.	b. Replace fuse. (F-1 or F-2)
	c. Main POWER switch not in ON position.	c. Place switch in ON position.
	d. Interlock switch open indicating one of the following:	
	(1) Paper supply exhausted	(1) Load chart paper
	(2) Writing table not in proper position	(2) Position writing table
	(3) Faulty interlock switch	(3) Replace interlock switch
2. No power to pens. **NOTE: No power to pens is normal if chart speed STOP button is depressed.**	a. Blown fuse, on Timer Control Board.	a. Replace fuse.
3. Chart paper drive does not operate.	a. Main POWER switch not in ON position.	a. Place switch in ON position.
	b. Chart speed STOP button depressed.	b. Select proper speed.
	c. LOCAL or REMOTE button not depressed.	c. Depress proper button.
	d. Lack of power at source.	d. Connect to correct power source.
	e. Interlock switch open.	e. Check for open paper drawer or exhausted paper supply.
	f. Drive belt broken.	f. Replace drive belt.
	g. Incorrect paper tension.	g. Set paper tension.

TABLE 4-1 GENERAL SYSTEM FAULT LOCATION (Continued)

FAULT	CAUSE	REMEDY
4. Pen writes intermittently or not at all.	a. Insufficient ink supply. b. Pen clogged. c. Individual ink valve in OFF position.	a. Fill ink master cylinder. b. Clean pen. c. Slide ink valve to ON position.
5. Individual pen trace extremely heavy.	a. Improper pen pressure. b. Pen tip not fully in contact with paper.	a. Adjust pen pressure. b. Lap pen.
6. Pen tip gouges or tears paper.	Improper pen pressure.	Adjust pen pressure.
7. Pen will not travel on timing line.	Improper pen alignment.	Align pen.
8. One pen does not move or moves uncontrollably.	a. Penmotor failure. b. Apply a signal to the drive amplifiers. If pen moves normally, failure is in the preamplifier. If pen does not move, failure is in drive amplifier.	a. Plug penmotor harness from operating channel into failed penmotor. If pen does not move, penmotor defective and must be replaced. b. Refer to drive amplifier schematic wiring diagram.
9. Amplifier inoperative.	a. Blown fuse on power supplies. b. Amplifier not positioned properly.	a. Replace fuse or fuses as necessary. b. Press fully into position.
10. Any one channel stops operating.	a. One drive amplifier assembly inoperative. b. Loose connections.	a. Replace drive amplifier. b. Check all connections.
11. Any one channel stops operating.	Fuses blown on Control Timer Board (F101-F108).	Replace fuse as necessary.

TABLE 4-2 OSCILLOGRAPH FAULT LOCATION

FAULT	CAUSE	REMEDY
1. No power to pens.	Drive Amplifier Board not installed properly or making poor connection.	Check for proper installation.
2. Chart paper speed not not as indicated.	a. CR-701, CR-702, C-702 defective. (28V.D.C. power supply) b. F-702 defective.	a. Replace. b. Replace.
3. Horizontal Oscillograph will not slide properly.	Improperly adjusted slide locking mechanism.	Refer to Section II, Installation.
4. Pen will not deflect when input signal is applied.	a. Defective drive amplifier. b. Penmotor coil open (internal).	a. Refer to drive amplifier schematic or replace drive amp board. b. Replace penmotor. Refer to Gould Service Center.
5. Pen will not return to any given position (hysteresis) and appears "sluggish".	Loose pen	Refer to Section VI.
6. Penmotor movement irratic and/or abrupt or jerky.	a. Penmotor internal bearings seized (frozen). b. Penmotor drive shaft bent or damaged.	a. Replace penmotor. Refer to Gould Service Center. b. Replace penmotor. Refer to Gould Service Center.

SECTION V

DRIVE AMPLIFIER CALIBRATION

5.1 SCOPE

The Drive Amplifier boards in the Gould 200 1704 recording system have been factory calibrated. Under normal conditions recalibration will not be required unless parts have been replaced. This section then describes the procedures necessary to calibrate the Drive Amplifier boards (PN 886220), and provides a board layout along with its associated parts list. In addition, a board layout and parts list is provided for the Control Timer board (PN 886327).

5.2 TEST EQUIPMENT REQUIRED

Proper test equipment is essential. Use the equipment specified below or its equal.

a. Function Generator — Wavetek Model 110 or equal.

b. DC Calibration Source — Digitec Model 311 or equal.

5.3 PRELIMINARY SETUP

a. If the system contains preamplifiers, remove each preamp prior to calibrating the associated drive amp.

b. Depress oscillograph STOP button. POWER switch is in off position (not illuminated).

c. Plug power cord into J-1 on main connector panel and proper ac voltage source.

d. Turn oscillograph on by depressing POWER switch.

5.4 CALIBRATION PROCEDURE

Calibration is required on pen drive amplifiers (one per channel) and preamplifiers (if recorder is so equipped). Only pen drive amplifier calibration is discussed in this manual. Refer to the applicable preamplifier manual for its calibration.

Calibration controls and procedures are identical for all channels. Refer to Figure 5-1 and calibrate each pen drive amplifier as follows:

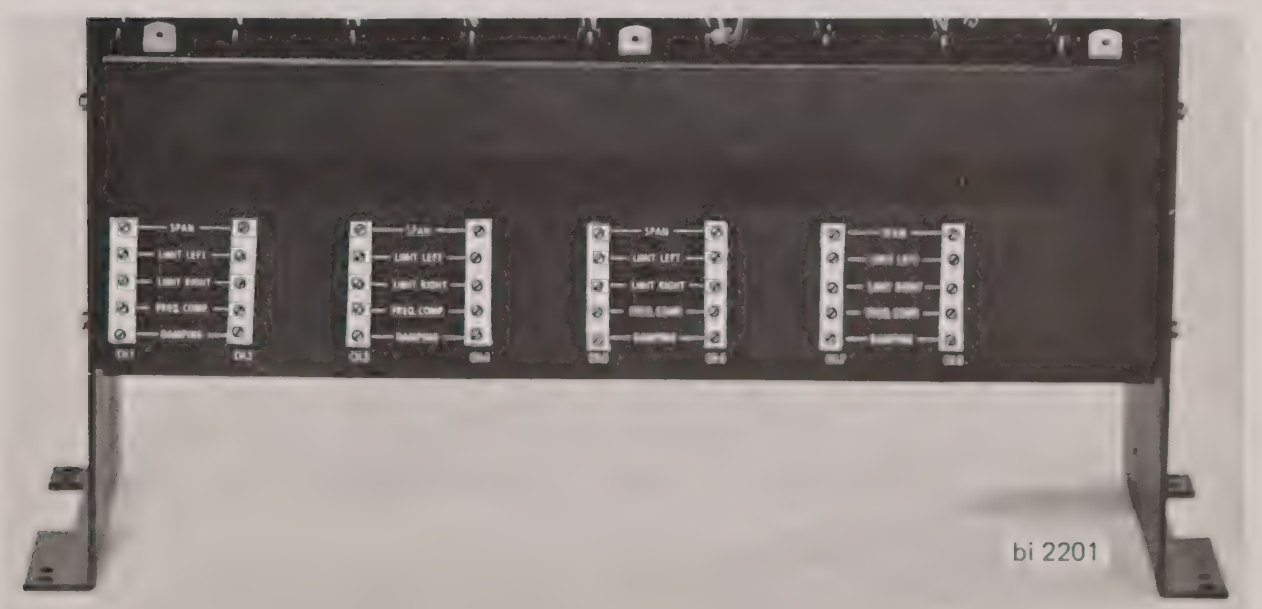


FIGURE 5-1 CALIBRATION CONTROLS

NOTE: When eight-channel preamplifier panel, Model 13-4185-10 is part of system, LEFT and RIGHT LIMITS (Steps 8 and 10 below) are interchanged. This is due to the inversion of output signals from the preamp panel to the amplifier. Unlike Figure 5-1, systems employing these preamp panels will have LIMITS marked correctly.

1. Connect dc calibration source to phone jack input of drive amplifier. Tip is high, ring is low.

2. Press oscillograph 5mm/sec CHART SPEED pushbutton.

3. Set dc calibration source to ZERO.

4. Set pen at channel center with pen position control.

5. Apply a +2.5 vdc ±0.25 mv signal to drive amplifier and adjust SPAN potentiometer (R-260) for full scale deflection within 0.1%.

6. Return dc calibration source to zero.

7. Turn pen position control full counterclockwise. Pen should deflect left to between 1.0 and 2.0 mm beyond full scale.

8. If deflection is NOT between 1.0 and 2.0 mm beyond full scale, adjust LEFT LIMIT potentiometer (R-208) for a 1.5 ±0.25 mm deflection beyond full scale.

9. Turn pen position control full clockwise. Pen should deflect right go between right to between 1.0 and 2.0 mm beyond full scale.

10. If deflection is NOT between 1.0 and 2.0 mm beyond full scale, adjust RIGHT LIMIT potentiometer (R-205) for a 1.5 ±0.25 mm deflection beyond full scale.

11. Connect function generator.

12. Apply a 4V p-p square wave with a 1.0Hz repetition rate.

13. Turn DAMPING potentiometer (R-231) clockwise until an overshoot is obtained. Then, turn slowly counterclockwise until overshoot is reduced to zero.

14. Check overshoot at 20 and 100 percent pen deflection. No overshoot should be present. Repeat Step 13 if necessary.

15. Increase chart speed to 25 mm/sec.

16. Apply a 5Hz sine wave, and adjust amplitude to obtain a 40 mm pen deflection.

17. Slowly increase frequency to 50Hz. Pen deflection should be within 0.5 mm of that at 5Hz.

18. If necessary, adjust FREQUENCY COMP potentiometer (R-209) until 50Hz deflection is within 0.5 mm of the 5Hz deflection.

5.5 DRIVE AMP AND CONTROL TIMER PART LISTS AND BOARD LAYOUTS

The part lists and board layouts that follow are provided as an aid in assisting the user to select proper parts as repair becomes necessary.

BOARD ASSEMBLY, DRIVE AMPLIFIER – 886220 (Schematic 292273)
FIGURE 5-2

SYMBOL NUMBER	PART NUMBER	DESCRIPTION
C201	10-125904-223	Capacitor
C202	10-247116-102	Capacitor
C203, 204	10-247116-102	Capacitor
C205	240352-501	Capacitor
C206	10-247116-103	Capacitor
C207	240352-501	Capacitor
C208	262585-106	Capacitor
C209	10-247116-103	Capacitor
C210, C211	10-247116-102	Capacitor
C212	240352-202	Capacitor
C213	10-125904-503	Capacitor
C214	10-125904-223	Capacitor
C215	281509-507	Capacitor
C216	262585-106	Capacitor
C217	281509-507	Capacitor
C218	262585-106	Capacitor
C219-222	286010-108	Capacitor
C223	288755-104	Capacitor (Used only for 80mmapplications.)
CR201, 202	263727	Diode, 1N961B
CR203-208	270508	Diode, IN4454
CR209,210	286018-1	Diode, MDA-101
CR211	269256-7	Diode, IN4007
CR212	270508	Diode, IN4454
Q201	281703-2	Transistor, 2N4403
Q202	281702-2	Transistor, 2N4401
Q203-205	286141	Transistor, 2N3904
Q206	1-230057-3	Transistor, 2N4923
Q207	1-286145-1	Transistor, 2N5982 (A-P)
	12-119918-4006	Screw
Q208	1-230058-3	Transistor, 2N4920
Q209	1-286147-1	Transistor, 2N5985 (A-P)
	12-119918-4006	Screw
Q210	281857-2	Transistor, 2N5033
R201	1-281851-30002	Resistor
R202	1-281851-1002	Resistor
R203	1-281851-43201	Resistor
R204	1-281851-10002	Resistor

BOARD ASSEMBLY, DRIVE AMPLIFIER – 886220 (Schematic 292273)
FIGURE 5-2

SYMBOL NUMBER	PART NUMBER	DESCRIPTION
R205	282299-103	Resistor
R206, 207	1-281851-69000	Resistor
R208	282299-103	Resistor
R209	282299-202	Resistor
R210	1-281851-200R0	Resistor
R211	1-281851-10002	Resistor
R212, 213	1-281851-10001	Resistor
R214	1-281851-16601	Resistor
R215, 216	1-281851-10000	Resistor
R217, 218	1-281851-80000	Resistor
R219	1-281851-72001	Resistor
R220	1-281851-40000	Resistor
R221	1-281851-80001	Resistor
R222	1-281851-40001	Resistor
R223, 224	5-241111-622	Resistor
R225	5-241111-392	Resistor
R226, 227	1-281851-50001	Resistor
R228	1-281851-10002	Resistor
R229	1-281851-60001	Resistor
R230	1-281851-60000	Resistor
R231	282299-502	Resistor
R232	1-281851-500R0	Resistor
R233	1-281851-10003	Resistor
R234	1-281851-26501	Resistor
R235	5-241111-104	Resistor
R236	5-241111-203	Resistor
R237	5-241111-822	Resistor
R238	5-241111-102	Resistor
R239, 240	5-241111-202	Resistor
R241	5-241111-391	Resistor
R242	5-241111-102	Resistor
R243	5-286587-181	Resistor
R244	5-283654-220	Resistor
R245	5-286587-181	Resistor
R246	5-241111-102	Resistor
R247	1-281851-20001	Resistor
R248	1-281851-500R0	Resistor
R249, 250	1-281851-80000	Resistor
R251	5-241111-104	Resistor
R252, 253	5-241111-103	Resistor

BOARD ASSEMBLY, DRIVE AMPLIFIER – 886220 (Schematic 292273)
FIGURE 5-2

SYMBOL NUMBER	PART NUMBER	DESCRIPTION
R254	1-281851-16001	Resistor
R255	1-281851-50000	Resistor
R256	5-241111-101	Resistor
R257	1-281851-20001	Resistor
R258	Not Used	
R259	1-282851-40001	Resistor
R260	282299-103	Resistor
R261	Not Used	
R262	5-241111-104	Resistor
R263, 264	5-130340-2R0	Resistor
R265	5-241111-822	Resistor
U201-204	280863-3	Integrated Circuit, 741C
U205	269941-2	Integrated Circuit, 1439P1
U206	280863-3	Integrated Circuit, 741C
U207	285461	Voltage Reg., MC 7815
		(A-P)
	12-119918-4005	Screw
		------*------
U208	285778	Voltage Reg., MC 7915
		(A-P)
	12-119918-4005	Screw
		------*------
U209, 210	Not Used	
U211	285589	Isolator, LED, 4N28
HS	686391	Heatsink
		(A-P)
	31-119918-4005	Screw
	1-118195-304	Washer
	1-216741-411	Lockwasher
		------*------
---	685187	Jack Assembly
J201	285315	Jack
J202	289045	Jack
		(A-P)
	1-120052-211	Lockwasher
		------*------
E1 thru E4	265763-3	Contact

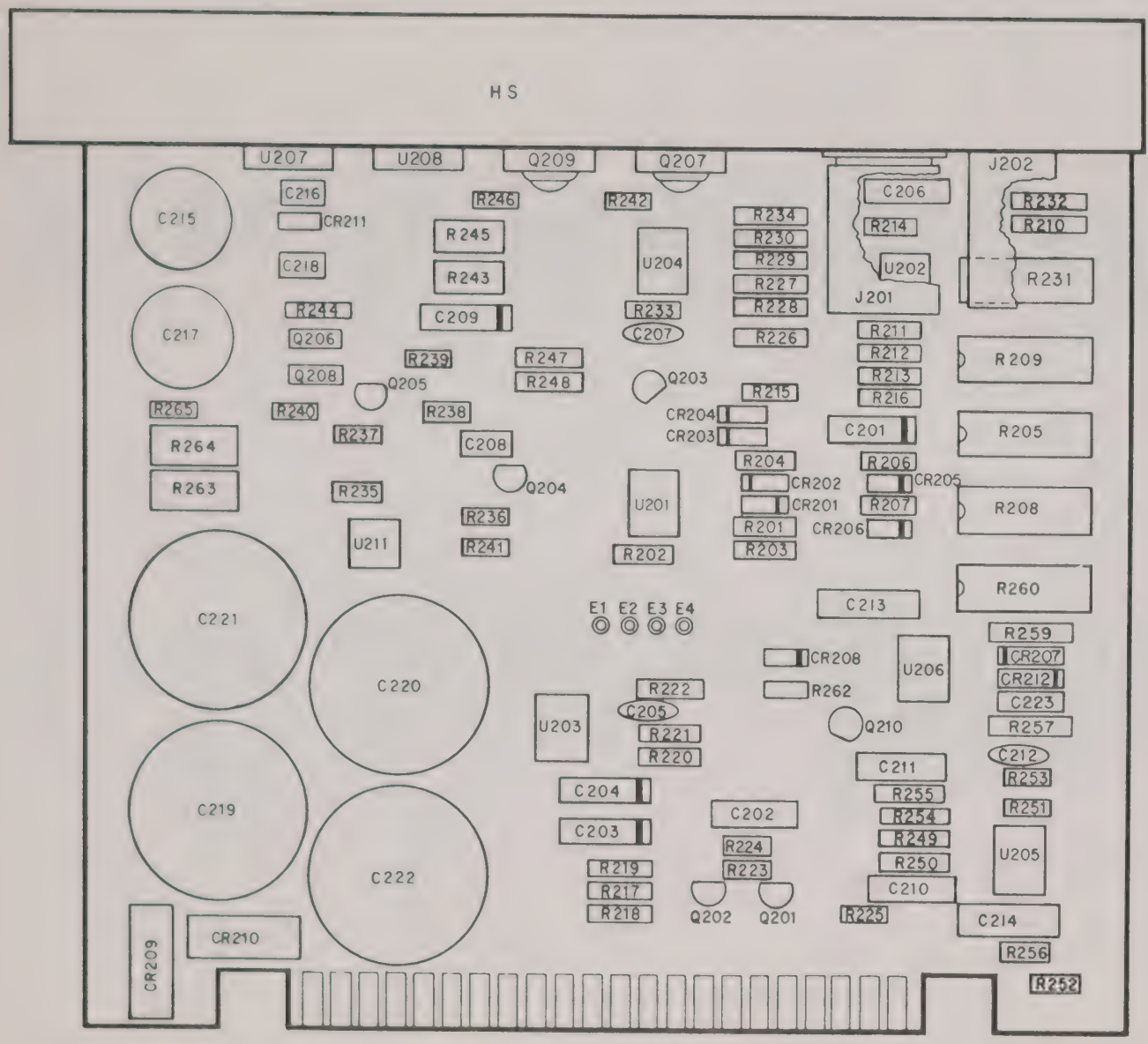


FIGURE 5-2 DRIVE AMPLIFIER BOARD ASSEMBLY

CONTROL-TIMER BOARD ASSEMBLY – 886327 (Schematic 292274)
FIGURE 5-3

SYMBOL NUMBER	PART NUMBER	DESCRIPTION
C101, 102	243037-507	Capacitor
C103	262585-106	Capacitor
C104	240352-102	Capacitor
C105	262585-475	Capacitor
C106	230098-104	Capacitor
CR101	286018-2	Diode, MDA104
CR102, 103	286018-1	Diode, MDA101
CR104	Not Used	
CR105, CR106	269256-7	Diode, 1N4007
CR123	280440	Diode, 1N4148
Jumper	267235	Jumper Circuit
K101	289048-24	Relay
Q101, 102, 104	292538-2	Transistor, 2N6427
R101, 102	5-241111-302	Resistor
R103	5-241111-242	Resistor
R104, 105	5-241111-103	Resistor
R106	5-241111-271	Resistor
R107	5-241111-103	Resistor
R108	5-241111-302	Resistor
R109	5-241111-104	Resistor
S103	268923	Switch
		(A-P)
	285179	Switchplate
	31-119918-4004	Screw
	1-118195-304	Washer, Plain
	1-216741-411	Lockwasher
		------*------
S104	286142-8	Switch
U101	285317	Voltage Regulator, MC7805CP
		(A-P)
	31-119918-4004	Screw
		------*------
U102 thru U105	270622	Integrated Circuit, 7493
U106	286016	Integrated Circuit, SN74121
U107	285589	Isolator, Led, 4N28
HS	686397	Heatsink
		(A-P)
	31-119918-4004	Screw
	1-118195-304	Washer, Plain
	1-216741-411	Lockwasher
		------*------
FC	285577	Fuse Clip

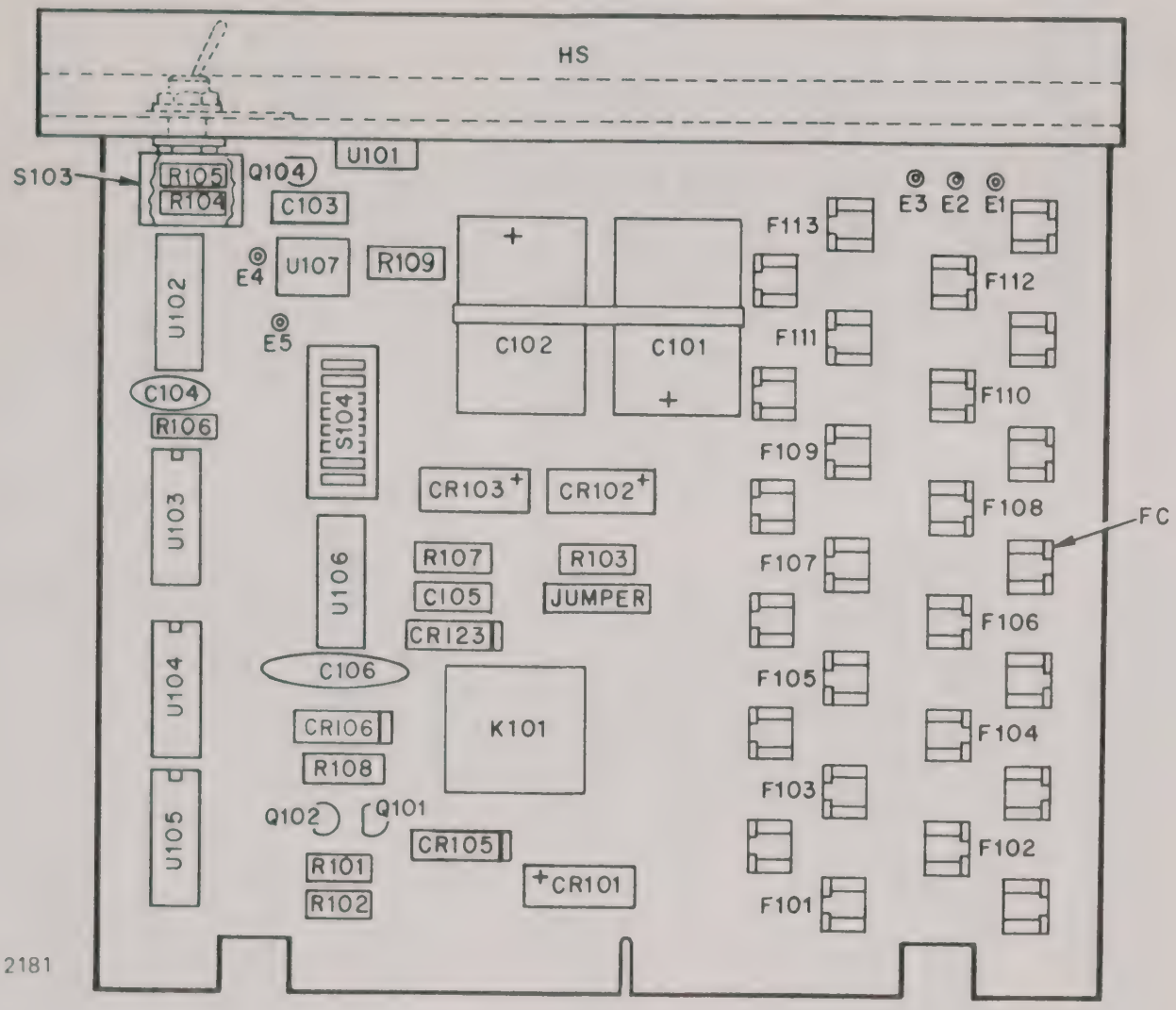


FIGURE 5-3 CONTROL TIMER BOARD ASSEMBLY

SECTION VI

MAINTENANCE

6.1 SCOPE

This section describes and illustrates various operators maintenance procedures for the Gould 1704 200 Recording system.

6.2 CLEANING AND INSPECTION

a. General

The cleaning and inspection procedures covered in this chapter are limited to normal or common conditions usually encountered.

b. Cleaning

The importance of cleaning must be thoroughly understood by maintenance personnel. The presence of dirt or foreign substances is a constant threat to satisfactory repair. All parts must be cleaned before inspection, after repair and before assembly. Protect all parts from accumulation of dust and grit after cleaning. Avoid getting petroleum products such as dry-cleaning solvents, mineral spirits paint thinner or lubricants on rubber coverings or parts as they will deteriorate.

c. Inspection

Inspect electrical cables for insulation cracks due to excessive heat. Check cables for frayed or worn ends at connectors and check cable clamps for secureness. Check solder connections and printed circuit boards for cracks and proper soldering techniques. Check cable connectors for bent or distorted pins. Check for mechanical tightness including mounting of parts, nuts, screws, and lockwashers. Check for silkscreening clarity and touch-up chipped paint.

6.3 TOOLS AND EQUIPMENT

Tools and equipment listed in Table 6-1 are necessary to perform the maintenance procedures described in this manual. Items marked with an asterisk are shipped with the recorder.

TABLE 6-1 MAINTENANCE TOOLS AND EQUIPMENT

ITEM	PART NO.	REFERENCE		USE
		FIG.	PARA.	
Gage, Gram*	240601-910	6-8	6.12	Used to check pen pressure.
Scale (0-15 pounds)		6-2	6.8	Used to check paper tension.
Paper Supply Wrench*	242723-910	6.3	6.5	Used to install chart paper.
Wrench, Pen Pressure Adjustment*	1-120922-18	6-9	6.13	Used with gram gage to adjust pen pressure

6.4 LOADING OR CHANGING CHART PAPER VERTICAL OSCILLOGRAPH

The following procedure describes and illustrates the correct method of loading or changing chart paper.

1. Turn off equipment.

2. Release bezel lock on front of oscillograph (Figure 6-2).

3. Pull chart paper drawer out as far as possible.

4. Lift paper drag and remove supply roll shaft from chart paper drawer.

5. Remove paper core from shaft.

6. Place chart paper on shaft, so when shaft flange is on the left, paper will feed from roll with printed side up toward operator.

7. Turn paper supply roll shaft, with wrench which is stored in the paper supply drawer, counterclockwise until shaft flange is firmly against paper roll.

8. Place paper supply in drawer. Press in on right end and slide paper supply into position, making certain roll is completely seated, and release paper drag against roll.

NOTE: When installing paper supply, make certain flange is on left as operator faces instrument.

10. Position chart paper over writing bar, down over writing table behind reversible drive roller, then out between pressure roller and drive roller. This is for external operation (Figure 6-1).

NOTE: Be sure drive roll selector is in the external position (Figure 6-2).

For internal rewind, thread paper in front of reversible drive roller, back over pressure roller, under guide rods, then attach to top of takeup core (Figure 6-1).

NOTE: Be sure drive roll selector is in the internal position (Figure 6-2)

11. Check that the paper edges are an equal distance from side plates at right and left event pens and that event marker pens are centered in margins. A paper centering adjustment is provided on instrument left side plate, but this is factory set and normally

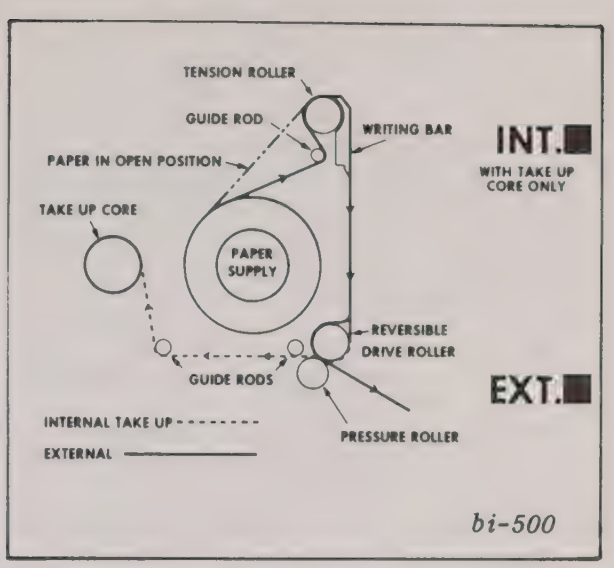


FIGURE 6-1 LOADING CHART PAPER

requires no readjustment. In the event adjustment is necessary, refer to Paragraph 6.10.

NOTE: Do not slide paper supply right or left on paper supply shaft. The paper core should always be against the flange.

12. Push paper drawer into writing position and engage bezel lock.

13. Operate oscillograph to run out about 10 feet of chart paper to be certain centering is correct and to allow chart tracking to stabilize. If paper is not centered, refer to Paragraph 6.10.

FIGURE 6-2 VERTICAL OSCILLOGRAPH LEFT SIDE

6.5 LOADING OR CHANGING CHART PAPER (HORIZONTAL OSCILLOGRAPH)

The following procedure describes and illustrates the correct method of loading or changing chart paper.

1. Press oscillograph STOP button.

2. Press both release levers (Fig. 6-3) and pull out oscillograph.

3. Lower both side panels (Fig. 6-3).

NOTE: Right and left means operator's right and left as he stands in front and faces unit.

4. Tear off chart paper against serrated edge and push pressure roller release lever (Fig. 6-3) down to release pressure on paper.

5. Pull paper from between drive and pressure rolls.

6. Lift front edge of writing table far enough to release ink pressure in pens. This may release droplets of ink under each pen. Slide paper forward along table surface until ink flow stops.

7. The writing table may now be raised to approximately 45° and withdrawn from side plate notches.

CAUTION: Careless paper loading techniques may result in damage to pens. Keep paper against writing table during removal and insertion of table. Avoid contact with pen tips.

8. Pull out soiled chart paper, tear off and discard.

CAUTION: Ink is indelible.

9. Raise paper drag assembly up and out of the way to self latching position.

10. Lift paper supply shaft up and out of oscillograph.

11. Remove paper core from shaft with tool stored on right side of oscillograph (Fig. 6-3).

12. Place chart paper on shaft with shaft flange on right side so that paper will feed from under side of roll going away from the operator. Tighten core firmly against flange.

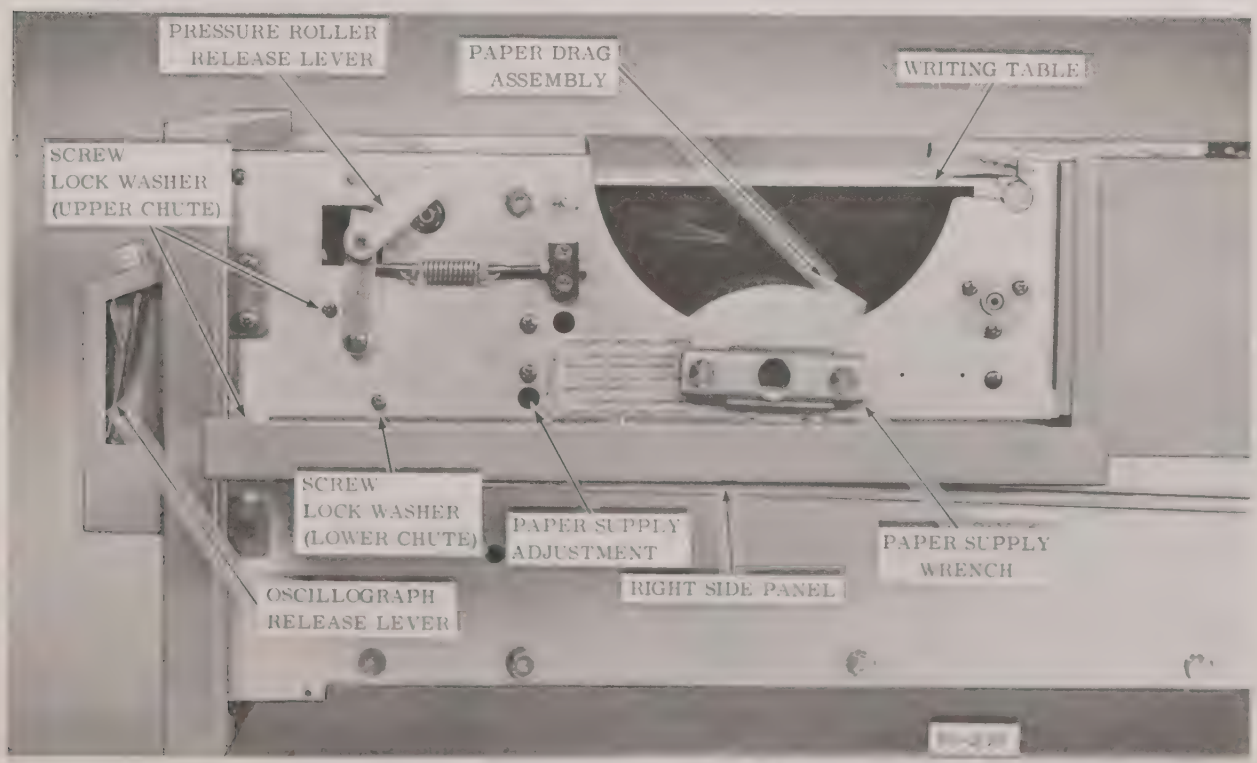


FIGURE 6-3 HORIZONTAL OSCILLOGRAPH RIGHT SIDE

13. When installing paper supply in oscillograph, make certain flange is on the right as operator faces instrument. Press in on right end and slide paper supply into position, making certain shaft is completely seated.

14. Unroll approximately two feet of chart paper and lower paper drag assembly to rest on supply roll.

15. Place the writing table under the unrolled portion of paper, making certain paper is flat against the table and carefully install writing table into position. Avoid touching pens. Press down firmly until snap catch is engaged.

NOTE: The writing table interlock switch will prevent operation of the instrument unless snap catch is engaged.

16. Feed chart paper down into chute between pressure and drive rolls and out front of oscillograph.

17. Pull paper taut and flat over writing table and reset pressure roller.

18. Check that the paper edges are an equal distance from the side plates at the right and left event pens and that the event marker pens are centered in the margins. A paper centering adjustment is provided on the oscillograph left side plate, but this is factory set and normally requires no readjustment. In the event adjustment is necessary, refer to Paragraph 6.10.

NOTE: Do not slide paper supply right or left on the paper supply shaft. The paper core should always be kept against the flange.

19. Operate oscillograph to run out about 10 feet of chart paper to be certain centering is correct and to allow chart tracking to stabilize.

6.6 CHART PAPER SUPPLY INDICATOR

After loading chart paper, check PAPER SUPPLY indicator. If indicator does not registor correct length of full roll as marked on chart paper roll, adjust indicator according to instructions located on right side of oscillograph.

6.7 INK SUPPLY

The ink is contained in a graduated master cylinder with an indicator to check ink supply at a glance. Normally a two-ounce supply contains sufficient ink for approximately 50 rolls of average recording. To replenish ink supply, the procedure is as follows:

1. Turn off equipment.

2. Loosen four captive thumb screws and pull oscillograph out as far as possible.

3. Unscrew cap from master cylinder (Figure 6-4 and 6-5).

4. Remove cap from ink syringe.

NOTE: Make sure ink is to tip of syringe to prevent air from entering ink system.

5. Screw syringe tip into master cylinder in a clockwise direction.

6. Inject ink into cylinder until gage on master cylinder shows just under two ounces.

CAUTION: Do not overfill pressurized inking system. This prevents inking system from returning to zero PSI when unit is turned off.

7. Unscrew syringe from master cylinder.

8. Replace cap on master cylinder.

CAUTION: Make sure gasket is in place on cap.

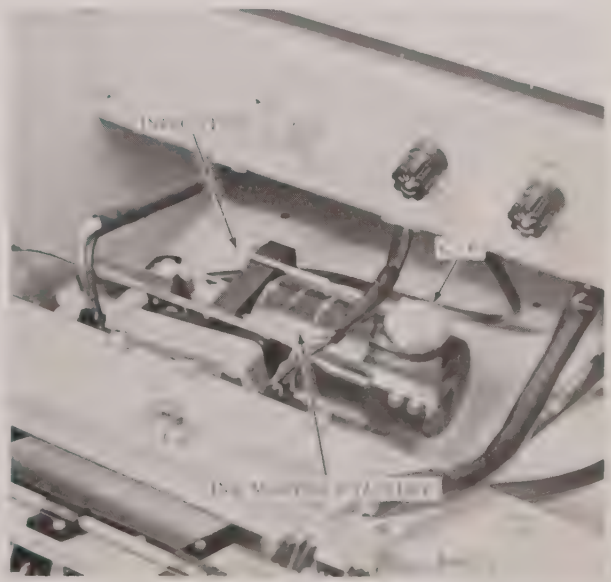


FIGURE 6-4 VERTICAL OSCILLOGRAPH INK MASTER CYLINDER

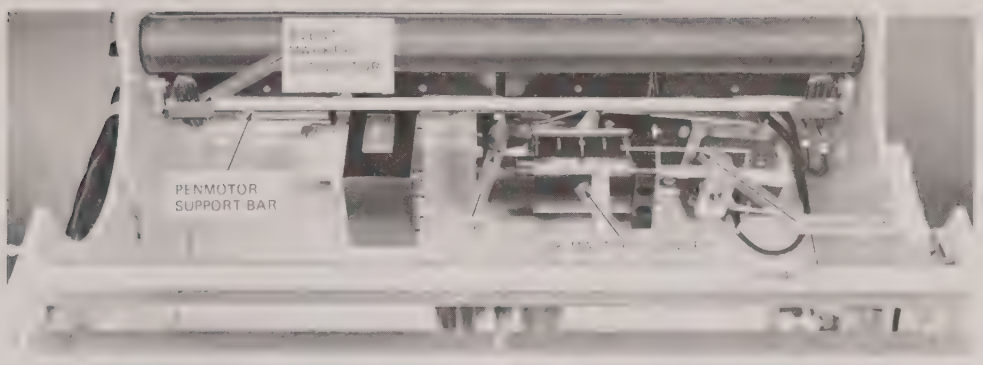


FIGURE 6-5 HORIZONTAL OSCILLOGRAPH INTERIOR - Reference View

9. Replace cap on ink syringe.

10. Install chart paper as described in paragraph 6.4 and 6.5.

11. Push oscillograph into unit and secure.

NOTE: Always keep paper under pen tips and ink in master cylinder. Do not allow unit to remain out of service for longer than four hours without ink in the cylinder.

6.8 CHART PAPER TENSION

The back tension or drag on chart paper should be enough to keep paper taut over writing edge of writing bar, but not enough to restrict chart travel. Tension should measure between 7 and 7½ pounds for the vertical oscillograph and between 5 and 12 pounds for the horizontal oscillograph.

The procedure for measuring and adjusting tension is as follows:

1. Pull paper from between drive and pressure rollers.

2. Fold corners at end of chart paper at approximately 45 degree angles to form a point at chart center.

3. Use a suitable clamp or cellophane tape and attach a spring balance scale at folded point of chart paper.

4. Pull spring balance scale parallel to writing table and ahead of drive roller. Measure tension.

5. The tension roller adjustment, located on left side of oscillograph, may be tightened or loosened to obtain required reading. (Figure 6-2)

6.9 PRESSURE ROLLER

The force holding pressure roller against drive roller should be 8 ± ¼ pounds as measured at ends of pressure roller shaft. (See Figure 6-6.) The procedure for measuring and adjusting roller pressure is described below and is the same for both the vertical and horizontal oscillographs.

1. Release bezel lock on front of oscillograph.

2. Remove chart paper from between drive and pressure rollers.

3. Insert a small sample piece of chart paper between pressure roller and drive roller.

NOTE: A separate paper sample must be between each side of drive and pressure rollers before any measurement or adjustment can be made.

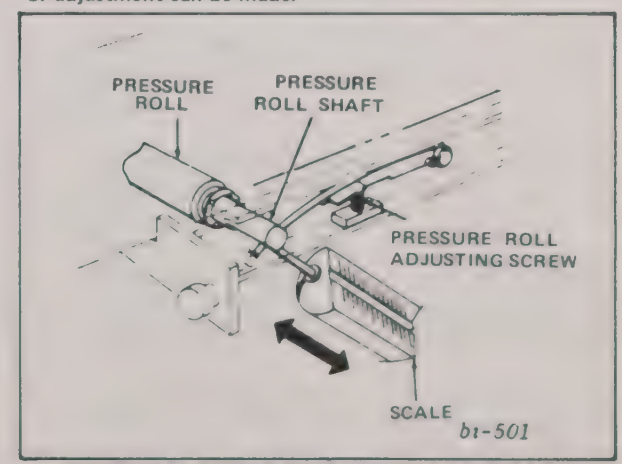


FIGURE 6-6 VERTICAL OSCILLOGRAPH PRESSURE ROLLER ADJUSTMENT

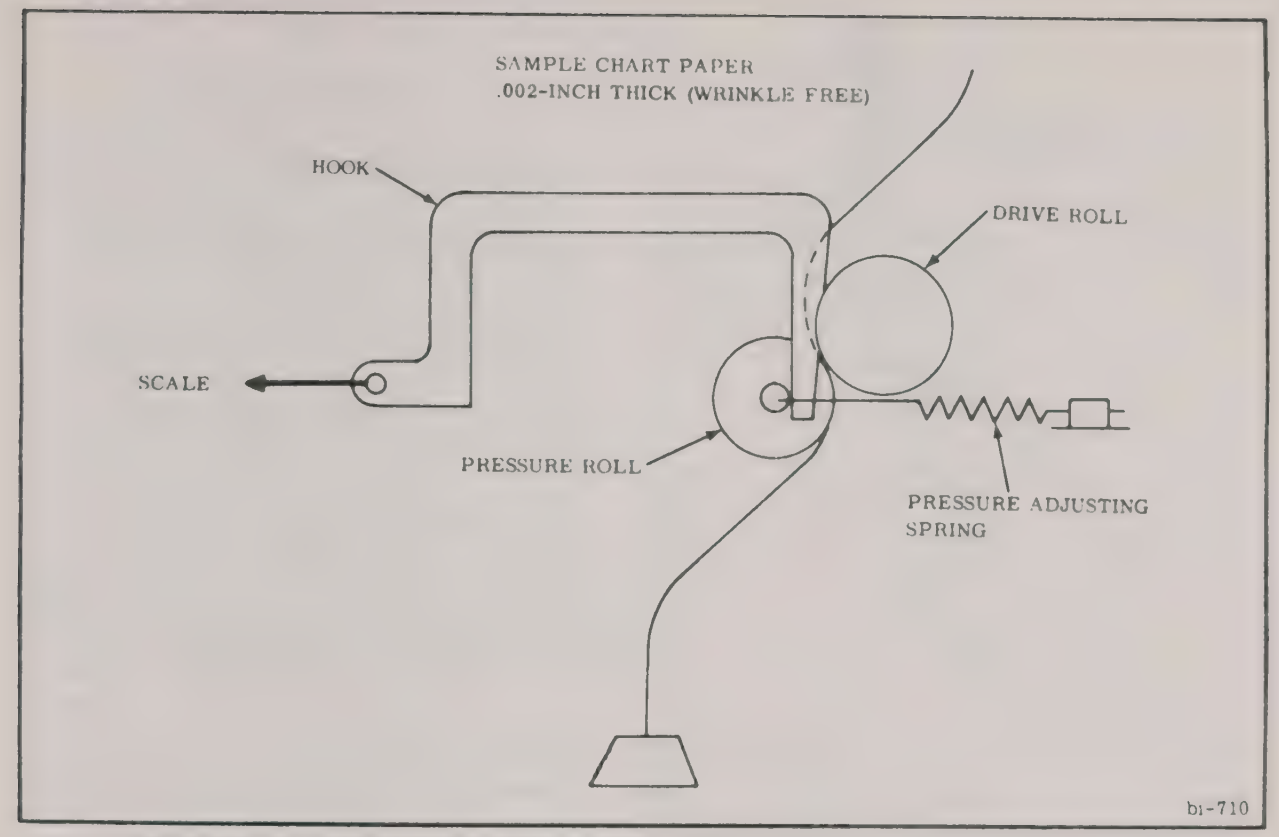


FIGURE 6-7 HORIZONTAL OSCILLOGRAPH PRESSURE ROLLER ADJUSTMENT

4. Engage bezel lock.

5. Hook scale around right end of pressure roller shaft and pull in direction shown in Figure 6-7.

6. Gently pull paper sample on right side at same time as scale.

7. Paper sample should release when scale reading is 8 ± ¼ pounds.

8. If scale reading indicates adjustment is necessary, turn adjusting screw (Figure 6-7) until proper reading is obtained.

9. Repeat measurement on left end of pressure roller shaft making certain sample paper is between both rollers.

10. Adjust left side in the same manner.

6.10 PAPER CENTERING AND TRACKING

1. Check that chart edges are equal distances, within .03 inch, from side plates and that event marker pens are centered in margins. The paper centering adjustment is provided on oscillograph left side plate. (Figure 6-2).

NOTE: Do not slide paper supply right or left on paper supply shaft. The paper core should always be kept tightly against flange.

2. By turning the adjustment clockwise the paper moves to the right. Counterclockwise will make the paper move to the left.

3. Operate oscillograph to run out about 10 feet of chart paper to be certain centering is correct and to allow chart tracking to stabilize.

4. Operate oscillograph at 20 millimeters per second and run out 20 feet of chart paper.

5. Chart wander should not exceed .025 inch as paper passes over writing bar. Use event marker trace to chart edge for reference.

6. If chart wander exceeds .025 inch refer to Paragraphs 6.8 and 6.9.

6.11 CHART SPEED MEASUREMENT

1. Operate oscillograph at 200 millimeters per second.

2. Measure distance chart moved during one second pulses of event marker.

3. Distance should be one meter ± 2.5 millimeters. Accuracy of chart speed should be within ± 0.25%.

6.12 PEN PRESSURE MEASUREMENT

Analog or event marker pen pressure should be checked if the ink trace is excessively wide (bleeding), indicating low pen pressure or if pen gouges the chart paper, indicating excessive pen pressure.

NOTE: Wide trace may also indicate an improperly lapped pen. Refer to Paragraph 6.14 for pen lapping procedures.

The gram gage (part number 240601-910) is used to measure the pressure of the analog and event marker pens as follows:

1. Turn ON recorder and set chart SPEED at 5 mm/sec.

2. Place gram gage hook under pen shaft, as close as possible to the tip, and form a right angle to the pen shaft with the gage body. (Figure 6-8)

3. Pull pen from chart as shown in Figure 6-8, and take reading on gage the moment excessive ink starts to flow from pen.

4. Proper pressure for analog pens is 30 ±2 grams, for event marker pen 25 ±2 grams.

5. If pen pressure is not within specified limits, adjust pressure using special pen adjustment wrench (Gould part number 1-120922-18). Refer to Figure 6-9. Turn screw clockwise to increase pressure, counterclockwise to decrease pressure.

NOTE: When pens are replaced, pen pressures must be checked and if required adjusted per above.

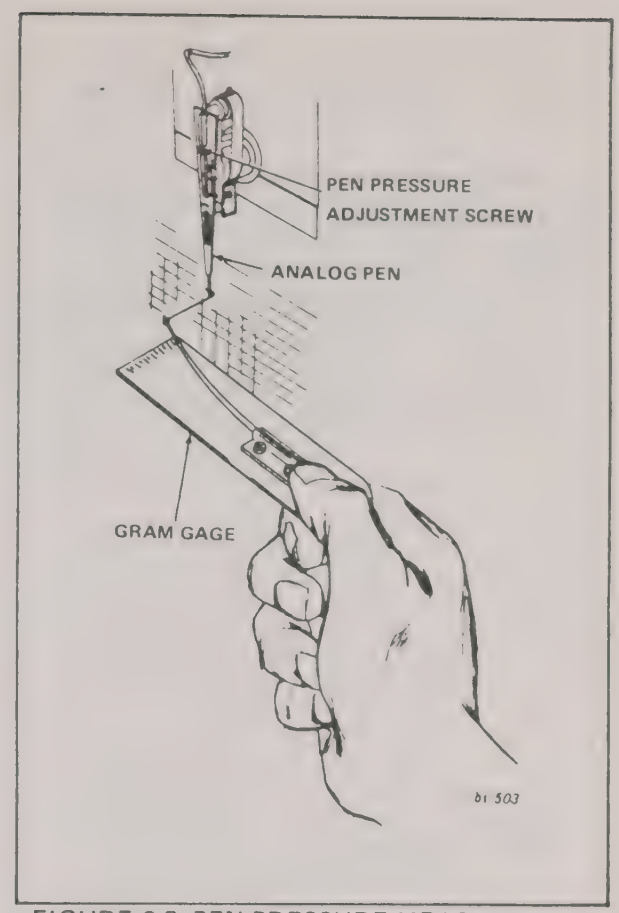


FIGURE 6-8 PEN PRESSURE MEASUREMENT

6.13 PEN PRESSURE ADJUSTMENT

Occasionally analog and event marker pens may require adjustment. This is indicated by wide ink traces (insufficient pen pressure) or damage to the chart paper at the pen tip (excessive pen pressure). Pressure adjustments of both analog and event marker pens are described below.

1. Load chart paper into oscillograph. Refer to Paragraph 6.4 or 6.5.

2. Connect oscillograph to correct power source.

3. Select a slow chart speed.

4. Measure pen pressure (Paragraph 6.12).

5. Adjust as required. Turn pen pressure adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure. (Figure 6-9)

6. Recheck pen pressure with gram gage and continue adjustment until proper reading is obtained.

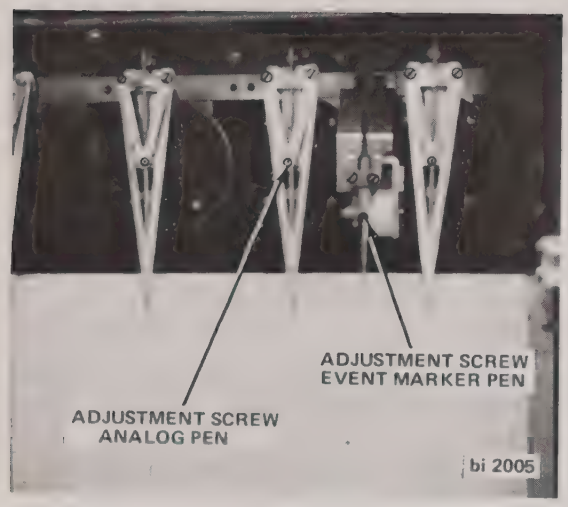


FIGURE 6-9 PEN PRESSURE ADJUSTMENT

6.14 PEN LAPPING

a. General

This paragraph describes and illustrates the proper procedures for lapping the analog and event pens. Intermittent or "wet" ink trace are indications that pen pressure is incorrect or that pen requires lapping. Check for "wet" writing by operating the recorder (no signal applied). Check pen trace by wiping index finger, with moderate pressure, across trace approximately one inch below pen tip. If ink does not smear, pen is properly lapped. If trace smears, check and adjust pen pressure (Paragraph 6.12). Repeat test, and if trace continues to smear, lapping is required.

b. Analog Pens

CAUTION: Lapping should only be done when absolutely necessary. Excessive lapping will shorten pen life.

1. Turn OFF oscillograph.

2. Carefully raise pen tip just enough to slide a small strip of emery paper (600A, Gould part number 669234) under pen tip.

3. Refer to Figure 6-10. Hold emery paper flat against writing table and move it in a circular motion several times while gently pressing pen tip with finger.

4. Remove emery paper and clean debris from pen tip. Operate oscillograph at 5 mm/sec chart SPEED.

5. Check pen trace by wiping index finger, with moderate pressure, across trace about one inch below pen tip. If ink does not smear, pen is properly lapped. If ink smears, check pen pressure per Paragraphs 6.12 and 6.13.

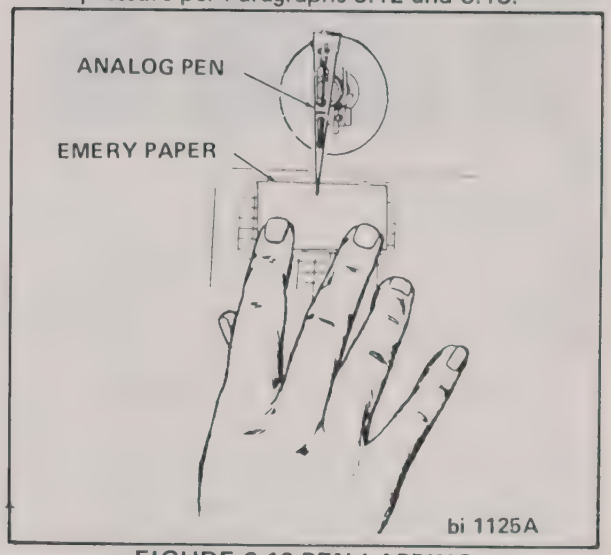


FIGURE 6-10 PEN LAPPING

6. Repeat lapping procedure if necessary.

7. If pen tip should become blocked during lapping operation, touch pen at top of pen (above tip) with a hot soldering iron for a few seconds with the pen tip raised slightly off the paper. This will usually start ink flowing and flush out abrasive.

8. When ink trace is dry, turn oscillograph off.

c. Event marker Pens

1. Connect oscillograph to correct power source.

NOTE: It is necessary for the oscillograph to be operating in order to lap event marker pens.

2. Place a small strip of emery paper, supplied with unit, under pen tip and hold in place.

3. Select a slow chart speed and allow to operate for 20 to 30 seconds with the event marker switch in the 1 second position.

4. Press STOP button and remove emery paper.

6.15 PEN REPLACEMENT

a. Analog Pen

NOTE: Removal and installation procedures for the 40mm and 80mm penmotor pen are identical.

1. Raise control panel on vertical oscillograph to gain access to pens. Pens are accessible on horizontal oscillograph.

2. Slide individual ink valve to OFF position.

NOTE: Each pen has an individual ink valve. Slide valve to the OFF position.

CAUTION: Do not permit ink to spill on oscillograph components. Place paper towels around area.

3. Disconnect pen tubing at manifold.

CAUTION: Do not pull tubing from manifold as this may damage manifold. Carefully work tubing down and then slide from manifold.

4. Loosen two screws (do not remove) which secure pen to drive arm and carefully slide pen off in downward or forward motion. (Figure 6-11).

NOTE: If pen does not readily slide off, it may be necessary to loosen pen pressure adjustment screw also.

5. Carefully slide new pen onto drive arm. Snug the two screws to secure pen.

6. Install new ink tubing between manifold and pen.

7. Slide ink valve to ON position.

8. Turn oscillograph ON and run at a chart speed of 5 mm/sec.

9. Carefully lift pen slightly and allow ink to bleed through pen tip.

10. Shut down oscillograph.

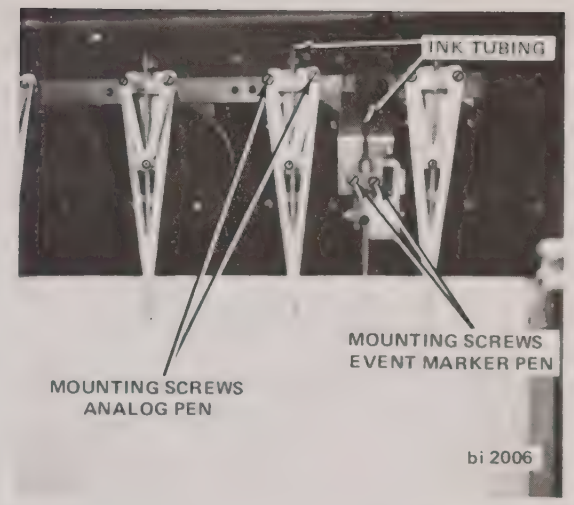


FIGURE 6-11 PEN REPLACEMENT

11. Gently grasp pen near hub and move pen across entire channel. If trace is not parallel to a horizontal line and/or pen is not on same line as other pens, turn pen in screw slots and slide pen vertically. Tighten screws.

12. Lap and set pen pressure per Paragraphs 6.13 and 6.14 if necessary.

b. Event Marker Pen

1. Raise control panel on vertical oscillograph to gain access to pens. Pens are accessible on horizontal oscillograph.

2. Slide individual ink valve to OFF position.

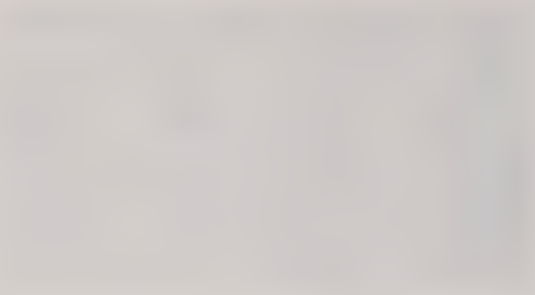
CAUTION: Do not permit ink to spill on oscillograph components. Place paper towels around area.

3. Disconnect pen tubing at manifold.

CAUTION: Do not pull tubing from manifold as this may damage manifold. Carefully work tubing down and then slide from manifold.

4. Loosen adjustment screw and two screws which secure pen to arm, and carefully slide pen off in downward motion. (Figure 6-11).

NOTE: If pen does not readily slide off, it may be necessary to loosen pen pressure adjustment screw.



5. Carefully slide new pen onto arm. Snug screws to secure pen. (Pen should be perpendicular to writing surface.)

6. Install new ink tubing between manifold and pen.

7. Slide ink valve to ON position.

8. Turn oscillograph ON and run at a chart speed of 5 mm/sec. Adjust pen ZERO to set pen on event gridline.

9. Carefully lift pen slightly and allow ink to bleed through pen tiip.

10. Shut down oscillograph.

11. If pen tip is not on same line as other pens, loosen screws and slide pen vertically. Tighten screws.

12. Lap and set pen pressure per Paragraphs 6.13 and 6.14 if necessary.

6.16 PEN CLEANING

In the event that a pen should fail to write or displays intermittent writing it may be caused by a clogged pen. The procedure outlined below is intended as a guide to flush the pens, but may not always prove effective:

1. Turn off recorder

2. Close ink valve on affected channel.

3. Remove ink tubing from ink manifold. Should brass nipple pull out of ink valve when removing ink tubing, clean and re-insert in valve.

4. Remove pen from penmotor (Paragraph 6.15).

5. Modify hypodermic needle per Figure 6-12.

6. Attach modified needle onto 2 cc hypodermic syringe.

7. Insert needle into pen tubing.

8. Immerse pen tip in cleaning agent. (Isopropyl Alcohol, Cell-O-Solve or equivalent).

9. Back-flush, using syringe plunger.

NOTE: It may be necessary to allow the pen to remain in the cleaning agent to dissolve dried ink at the tip.

10. Install pen (Paragraph 6.15).

NOTE: Clogging of pens occurs only when proper adjustment, operation and/or handling has not been adhered to.

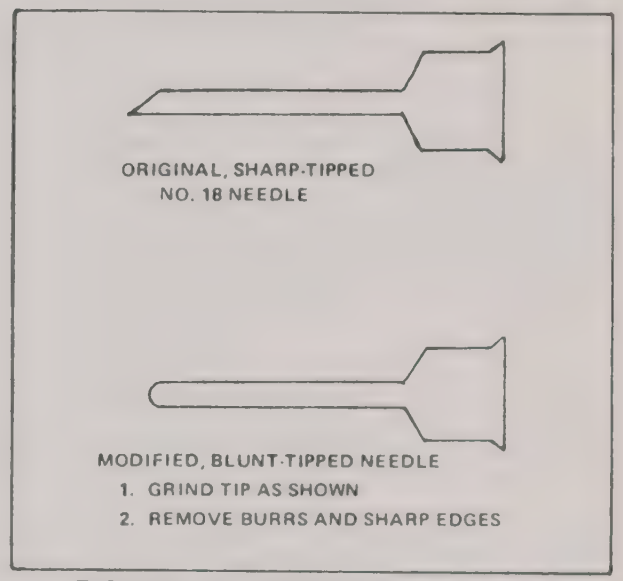


FIGURE 6-12 HYPODERMIC NEEDLE MODICIATION

6.17 MAINTENANCE TIPS ON INK SYSTEM

The following tips are supplementary to the maintenance procedures described in this section and are recommended for maximum performance and trace quality.

1. Never allow water to enter the inking system or pen. It can precipitate the dye out of the ink and cause clogging. For cleaning use ethyl alcohol or an ethylene glycol ether compound.

2. If ink accumulates at the pin tip after chart drive is shut off and pen tip is raised, there is probably air in the lines. Air can enter when a pen is changed or the writing table is left open and will cause skipping of the trace. To eliminate this, run chart at a slow speed and lift the pen tip away from the chart slightly. Allow ink to bleed until air pockets have escaped from the pen tip. Wipe the excess ink with a tissue stroking towards chart center to avoid staining the writing table.

3. When replacing plastic ink tubing after changing a pen or ink cartridge, be sure the tubing fits snugly over the mating parts. Damaged tubing, or tubing with ink on it can cause trouble. Ink acts as a lubricant and may cause a loosely fitted tube to slip off.

4. Never use the shut-off valves in the system to throttle ink flow. They are intended to be either fully open or closed. Also it is best not to shut off ink to unused channels because the ink lubricates and reduces pen tip wear and prevents paper particles from clogging the pen.

5. Always store the recorder with the pen tip against the paper, for exposure to the atmosphere will dry the ink at the tip. Should this occur, simply operate the chart drive and heat the pen tip with a soldering iron and lift the pen slightly to allow the dried ink to flush out. Should this fail to unclog the pen, refer to the paragraph on pen cleaning in this section.

CAUTION: Do not use an open flame to perform this operation as the ink is flammable.

6. Should the need arise to clean up any ink after changing pens or filling ink reservoir, the recommended ink remover is: Anchor Hand Cream, No. 25, obtainable from Anchor Office Supply, Cleveland, Ohio

6.18 REPLACING PENMOTOR DRIVE BAND (685270, 40mm or 684999, 80mm)

NOTE: Illustration shown is that of 40mm drive band, but replacement procedure for 80mm is essentially the same.

CAUTION: It is recommended that the drive band be replaced at the factory so that proper band tension is maintained. Should field replacement become necessary, perform the following steps.

NOTE: Refer to Figure 6-13 for location of parts in capital letters.

a. Band Removal

1. Remove Analog Pen Assembly.

2. Loosen (but do NOT remove) screws securing REAR BAND CLAMP.

3. Remove screw from front end of assembly. (FRONT BAND CLAMP will fall away from assembly with screw.)

4. Remove band by sliding free end in counter-clockwise direction thru BAND ANCHOR and REAR BAND CLAMP; then over TRANSITION PIECE attached to drive arm assembly.

5. Conclude removal by gently pulling band from BAND ANCHOR.

b. Band Replacement

1. Place hooked (or bent) end of DRIVE BAND over BAND ANCHOR as shown, and restring in clockwise direction over TRANSITION PIECE, and between BAND ANCHOR and REAR BAND CLAMP. Slot in DRIVE BAND should line up with hole in TRANSITION PIECE.

2. Replace screw and FRONT BAND CLAMP. Snugly tighten all screws, front and rear.

3. Apply 5.5 to 6.5 lbs of tension to free end of band with spring tension scale or other means.

4. Maintaining tension, fully tighten all screws and apply Glyptal cement (Gould P/N 11370) or equal at screwheads and mating surfaces.

5. Remove tension; then replace analog pen.

6. Check frequency response for compliance with specifications given in Section I.

6.19 FUSE REPLACEMENT

Fuses are located on the Timer Control Board assembly located in the Drive Amplifier frame, on the Main Connector panel, on the fuse panel in the vertical oscillograph, and on the bracket housing J-701 in the horizontal oscillograph. The fuse panel and the bracket (J-701) are both located in the vicinity of the ink pump assembly. Fuse symbols, ratings and part numbers follow.

1. Timer Control Board Assy
   a. F-101 thru F-108, 3/4 Amp P/N 116198-9.
   b. F-109, 1/4 Amp, P/N 116198-6.
2. Main Connector Panel
   a. F-1, 10 Amp, P/N 113182-10.
   b. F-2, 5 Amp, P/N 116198-14.
3. Fuse Panel or J-701 bracket.
   a. F-701, 3 Amp, P/N 102625-9.
   b. F-702, 1/2 Amp, P/N 116198-8.

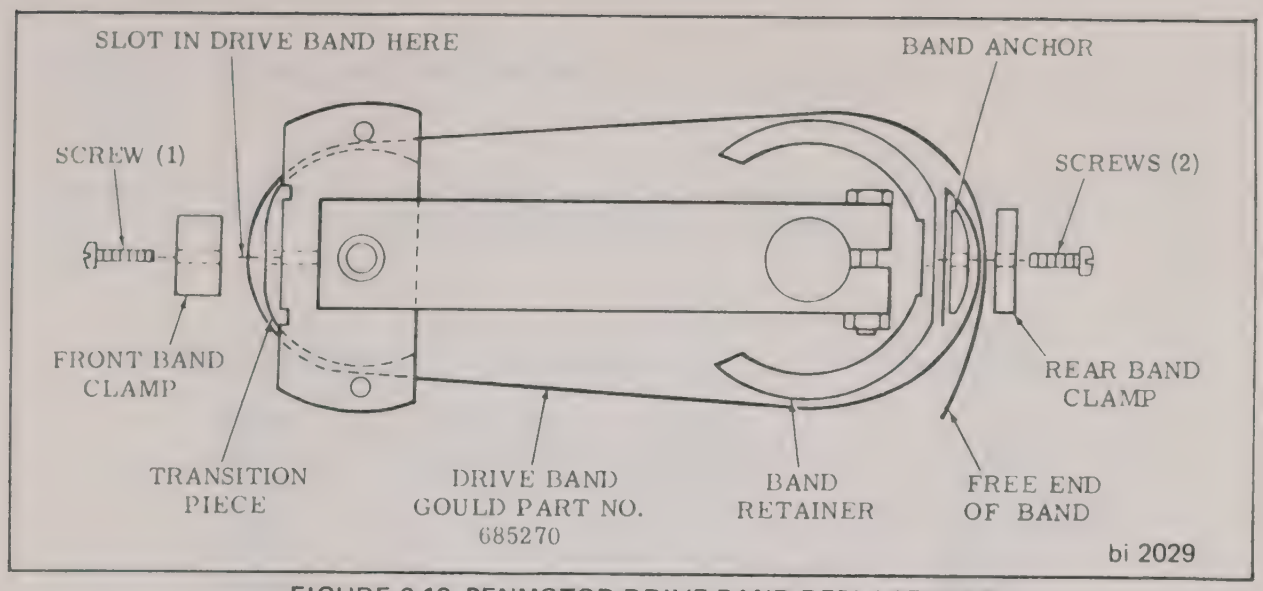


FIGURE 6-13 PENMOTOR DRIVE BAND REPLACEMENT

6.20 MULTI-CHOICE TIMER

a. General

The multi-choice timer, Model 11-2101-40, consists of two inter-geared cams driven by a synchronous motor, with each cam triggering separate switches. One cam rotates once per second and, thru its switch, energizes event marker with a 100 millisecond pulse at one second intervals. The selector cam produces a similar pulse every 10, 20, 30, or 60 seconds. Thus, depending upon position which is selected manually, there are 9 deflections to right, 1 to left, or 19 right and 1 left, or 29 right and 1 left, or 59 right and 1 left.

b. Setting Timer

1. Press oscillograph STOP button.
2. Turn off instrument.
3. Remove rear cover from oscillograph.
4. Disconnect timer leads from terminals 1, 2, 4, 5 and 6 at rear of oscillograph.
5. Press release lever and pull oscillograph out as far as possible.
6. Remove paper supply roll (Paragraph 6.4 or 6.5).
7. Remove two timer mounting screws from underside of oscillograph and remove timer from inside oscillograph.
8. Remove four screws and lockwashers and remove cover from timer.
9. Remove screw securing selector cam in position.
10. Rotate selector cam to choice of setting (10, 20, 30, or 60 seconds).

NOTE: The 10 second position on the event marker switch changes to the setting on the timer.

11. Install screw to lock selector cam in position.
12. Replace cover and install four screws and lockwashers.
13. Position timer in oscillograph and secure with two screws installed from underside of oscillograph.
14. Connect leads to terminals at rear of oscillograph as follows:

Terminal	Lead Color
1	Black
2	Black
4	Yellow
5	Green
6	Blue

15. Install paper supply roll (Paragraph 6.4 or 6.5).
16. Slide oscillograph back into unit.

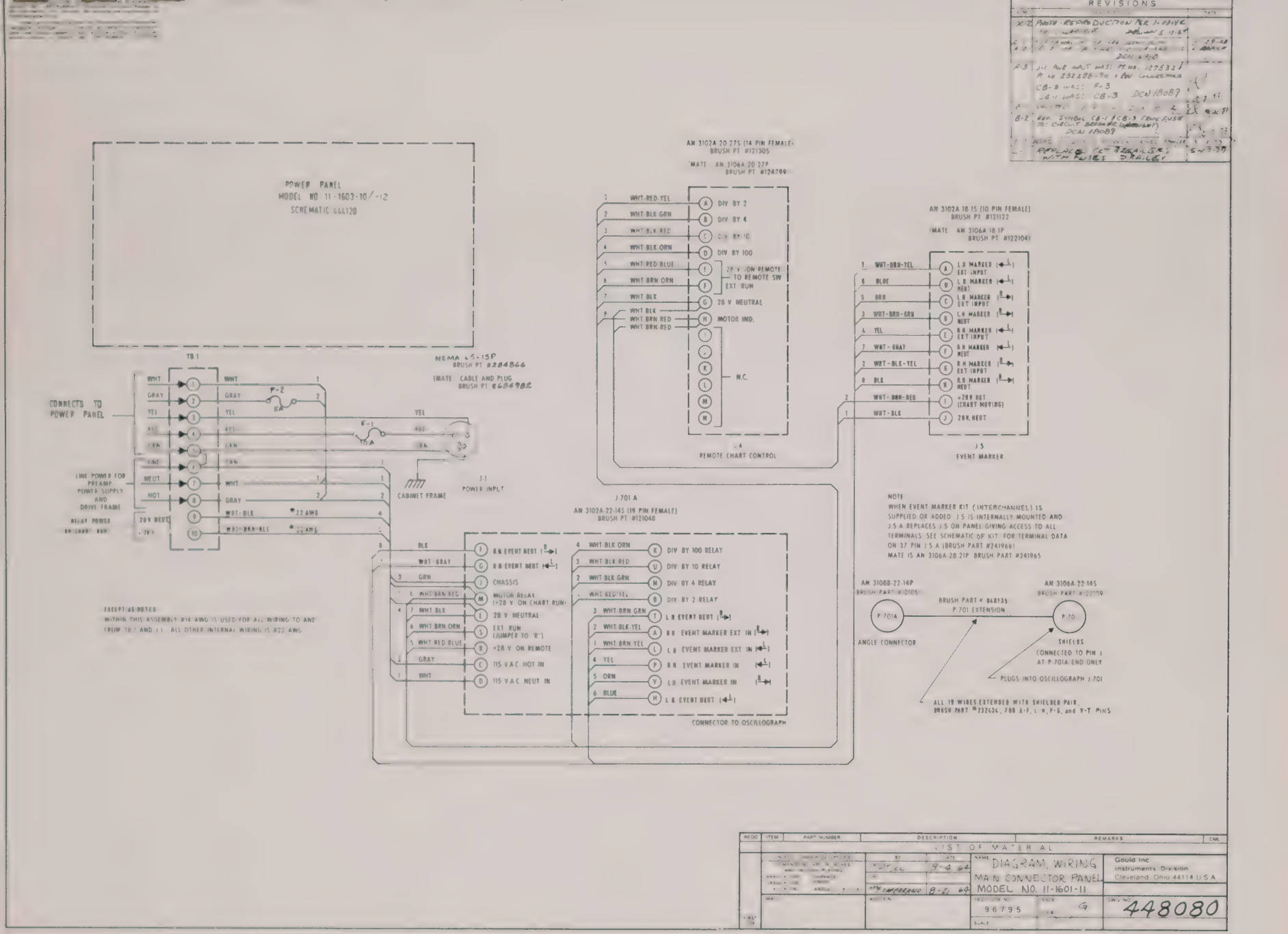
SECTION VII

SCHEMATICS, WIRING DIAGRAMS AND INSTALLATION DRAWINGS

7.1 GENERAL

This section contains schematics and wiring diagrams for the components covered in this manual. In addition, the installation drawing covering the Seven Interchannel Event Marker is included.

DRAWING NUMBER	COMPONENT	MODEL OR PART NUMBER
448080	Main Connector Panel	11-1601-11
444120	Power Panel Assembly	11-1603-12
292781	Horizontal Oscillograph	0000-2607-61
292585	Vertical Oscillograph	0000-2607-71
292560	Drive Amplifier Frame	692454-X
292273	Drive Amplifier Board	886220
292274	Control Timer Board	886327
262388	Seven Interchannel Event Marker Wiring Diagram	11-2221-02
692792	Seven Interchannel Event Marker Installation Drawing	11-2221-02


REVISIONS
POWER PANEL
MODEL NO 11-1603-10/-12
SCHEMATIC 446120
AN 3107A 20 27S (14 PIN FEMALE)
BRUSH PT #121305
MATE AN 3106A 20 27P
BRUSH PT #124799
WHT-RED-YEL
WHT BLK GRN
WHT BLK RED
WHT BLK ORN
WHT RED BLUE
WHT BRN ORN
WHT BLK
WHT BRN RED
DIV BY 2
DIV BY 4
DIV BY 10
DIV BY 100
28 V ON REMOTE
TO REMOTE SW
EXT RUN
28 V NEUTRAL
MOTOR IND.
N.C.
J 4
REMOTE CHART CONTROL
AN 3102A 18 1S (10 PIN FEMALE)
BRUSH PT #121122
MATE AN 3106A 18 1P
BRUSH PT #122104
WHT-BRN-YEL
BLUE
BRN
WHT-BRN-GRN
YEL
WHT-GRAY
WHT-BLK-YEL
BLK
WHT-BRN-RED
WHT-BLK
L.H. MARKER EXT INPUT
L.H. MARKER NEUT
R.H. MARKER EXT INPUT
R.H. MARKER NEUT
+28V HOT (CHART MOVING)
28V NEUT
J 5
EVENT MARKER
NEMA 5-15P
BRUSH PT #284866
MATE CABLE AND PLUG
BRUSH PT #684982
TB 1
CONNECTS TO POWER PANEL
LINE POWER FOR PREAMP POWER SUPPLY AND DRIVE FRAME
RELAY POWER
20V NEUT
WHT
GRAY
YEL
BLU
BRN
GRN
NEUT
HOT
F-2
5A
F-1
15 A
CABINET FRAME
J 1
POWER INPUT
22 AWG
J 701 A
AN 3102A-22-14S (19 PIN FEMALE)
BRUSH PT #121048
BLK
WHT-GRAY
GRN
WHT-BRN-RED
WHT BLK
WHT BRN ORN
WHT RED BLUE
GRAY
WHT
R.H. EVENT NEUT
R.H. EVENT NEUT
CHASSIS
MOTOR RELAY (+28 V ON CHART RUN)
28 V NEUTRAL
EXT RUN (JUMPER TO 'R')
+28 V ON REMOTE
115 VAC HOT IN
115 VAC NEUT IN
WHT-BLK ORN
WHT-BLK-RED
WHT-BLK-GRN
WHT-RED-YEL
WHT-BRN-GRN
WHT-BLK-YEL
WHT-BRN-YEL
YEL
ORN
BLUE
DIV BY 100 RELAY
DIV BY 10 RELAY
DIV BY 4 RELAY
DIV BY 2 RELAY
L.H. EVENT NEUT
R.H. EVENT MARKER EXT IN
L.H. EVENT MARKER EXT IN
R.H. EVENT MARKER IN
L.H. EVENT MARKER IN
L.H. EVENT NEUT
CONNECTOR TO OSCILLOGRAPH
EXCEPT AS NOTED
WITHIN THIS ASSEMBLY #14 AWG IS USED FOR ALL WIRING TO AND FROM TB 1 AND J 1. ALL OTHER INTERNAL WIRING IS #22 AWG
NOTE
WHEN EVENT MARKER KIT (INTERCHANNEL) IS SUPPLIED OR ADDED J 5 IS INTERNALLY MOUNTED AND J 5 A REPLACES J 5 ON PANEL GIVING ACCESS TO ALL TERMINALS. SEE SCHEMATIC OF KIT FOR TERMINAL DATA
ON 37 PIN J 5 A (BRUSH PART #241966)
MATE IS AN 3106A 28 21P BRUSH PART #241965
AN 3108B-22-14P
BRUSH PART #
AN 3106A 22-14S
BRUSH PART #
BRUSH PART = 840135
P 701 EXTENSION
P 701A
P 70
ANGLE CONNECTOR
SHIELDS
CONNECTED TO PIN J
AT P 701A END ONLY
PLUGS INTO OSCILLOGRAPH J 701
ALL 19 WIRES EXTENDED WITH SHIELDED PAIR.
BRUSH PART #232434, FOR A-F, L-N, P-S, and Y-T PINS
LIST OF MATERIAL
DIAGRAM, WIRING
MAIN CONNECTOR PANEL
MODEL NO. 11-1601-11
Gould Inc
Instruments Division
Cleveland, Ohio 44114 U.S.A.
96795
G
448080

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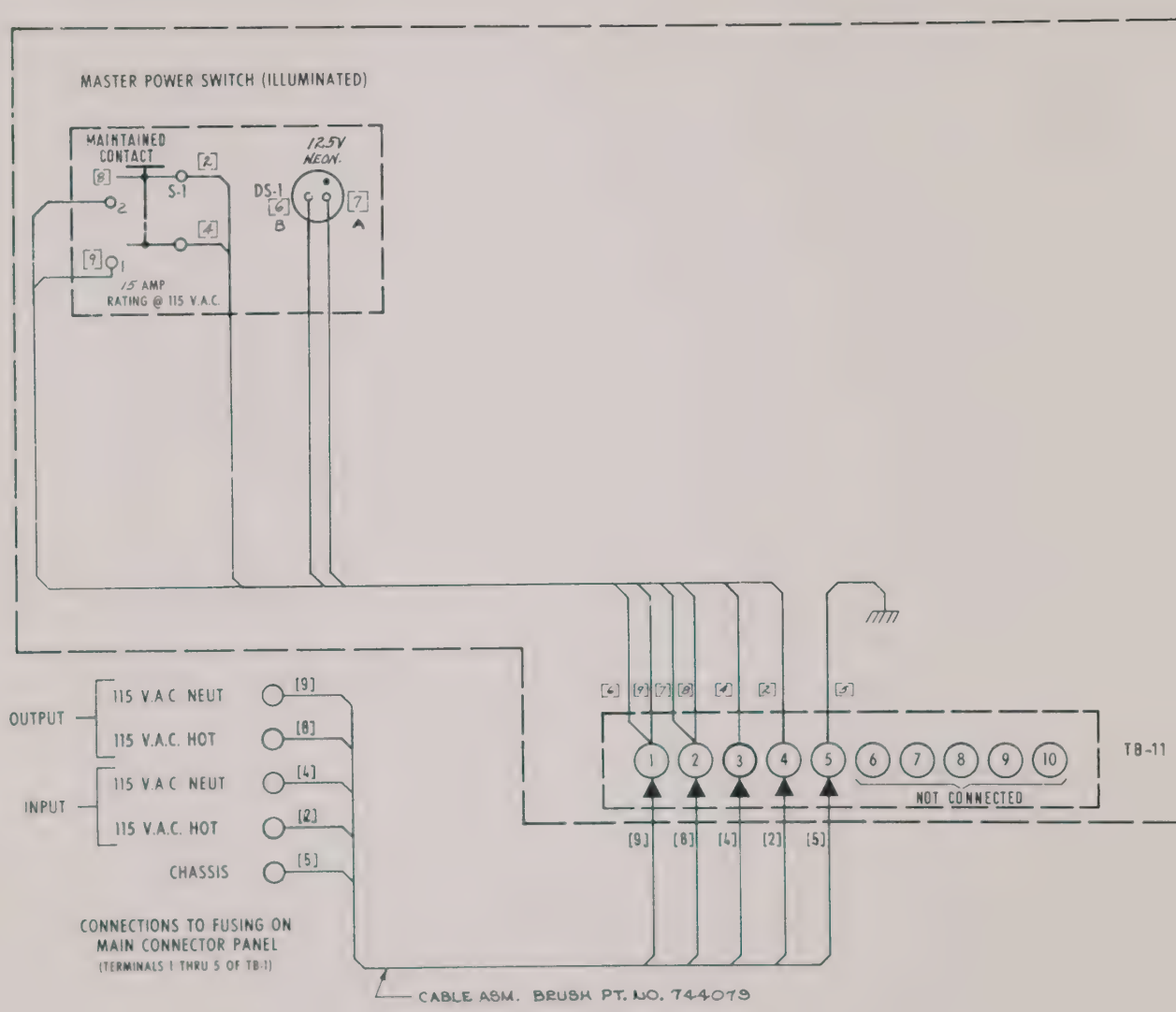


NOTES

1. ARROWS AT TERMINALS INDICATE LUG CONNECTIONS
2. WIRE COLORS IN EIA CODE SHOWN IN BRACKETS [ ]

REVISIONS

SYM.	DESCRIPTION	DATE	APPROVAL
A-1	REVISED PER MARKED PRINT. DCN 4804	7-21-65 Dalch	7/22/65 JM Dalmasch
A-2	REVISED WIRE COLORS FROM DS-1 AND S-1 TO TB-11. DCN 5350	10-24-65 Balch	E Enderlein 10-25-65
B-1	REVISED TO MEET UL SPEC. DCN 18124	7-19-72 BARTON	
C-1	ADDED 1,2,A & B TO MASTER POWER SWITCH DCN 22790	5/9/77	SMOTZER

444120

Gould Inc.
Instrument Systems Division
Cleveland, Ohio 44114 U.S.A.

REQD	ITEM	PART NUMBER	DESCRIPTION	REMARKS	CHL	NEXT ASSY	USED ON
			LIST OF MATERIAL			APPLICATION	

11-1603-10

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ANGLES = ±½°
.XX = ± .015
.XXX = ± .005 SURFACE = √

MATL

ADD FIN.

FIRST USE

DR. BY JORDAK 3-22-63 DATE
CH. BY DATE
APPR. FD Zaffarano 6/28/63 DATE

NAME
DIAGRAM, WIRING - SYSTEM POWER PANEL ASM.

CODE IDENT.
ISSUE CODE G
SCALE
WT.

DWG. NO. 444120

1 UNLESS OTHERWISE INDICATED:
ALL CAPACITANCE IN MICROFARADS,
ALL RESISTANCE IN OHMS,
ALL RESISTORS 1/2 WATT,
ALL WIRES #22 AWG.

2. WIRE COLORS IN EIA CODE SHOWN IN BRACKETS.

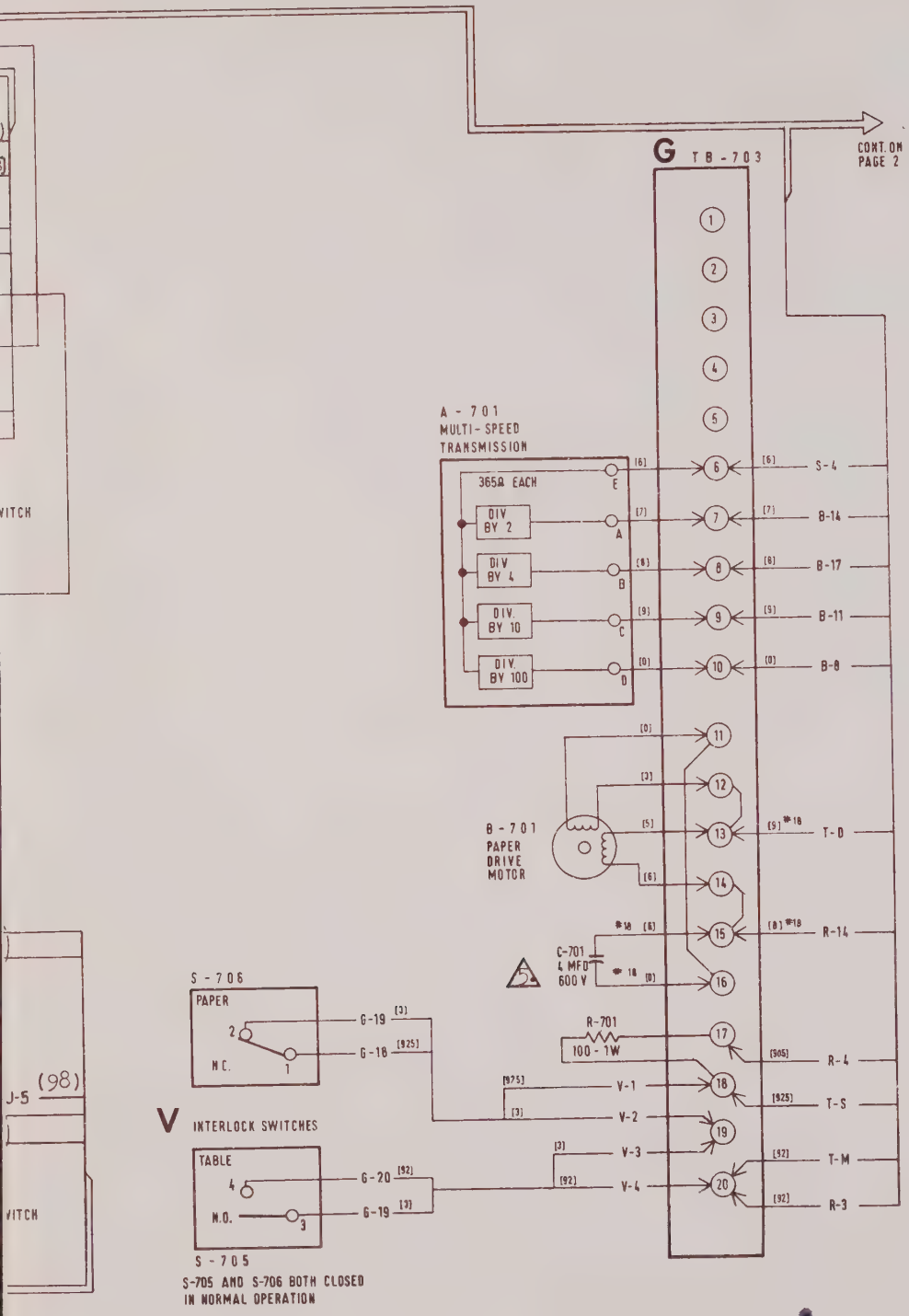
3 OPEN ARROW AT TERMINAL DENOTES PIN OR LUG TERMINATION.

⚠ FIRST 4 DIGITS DEPEND ON PERMOTOR COMBINATION USED

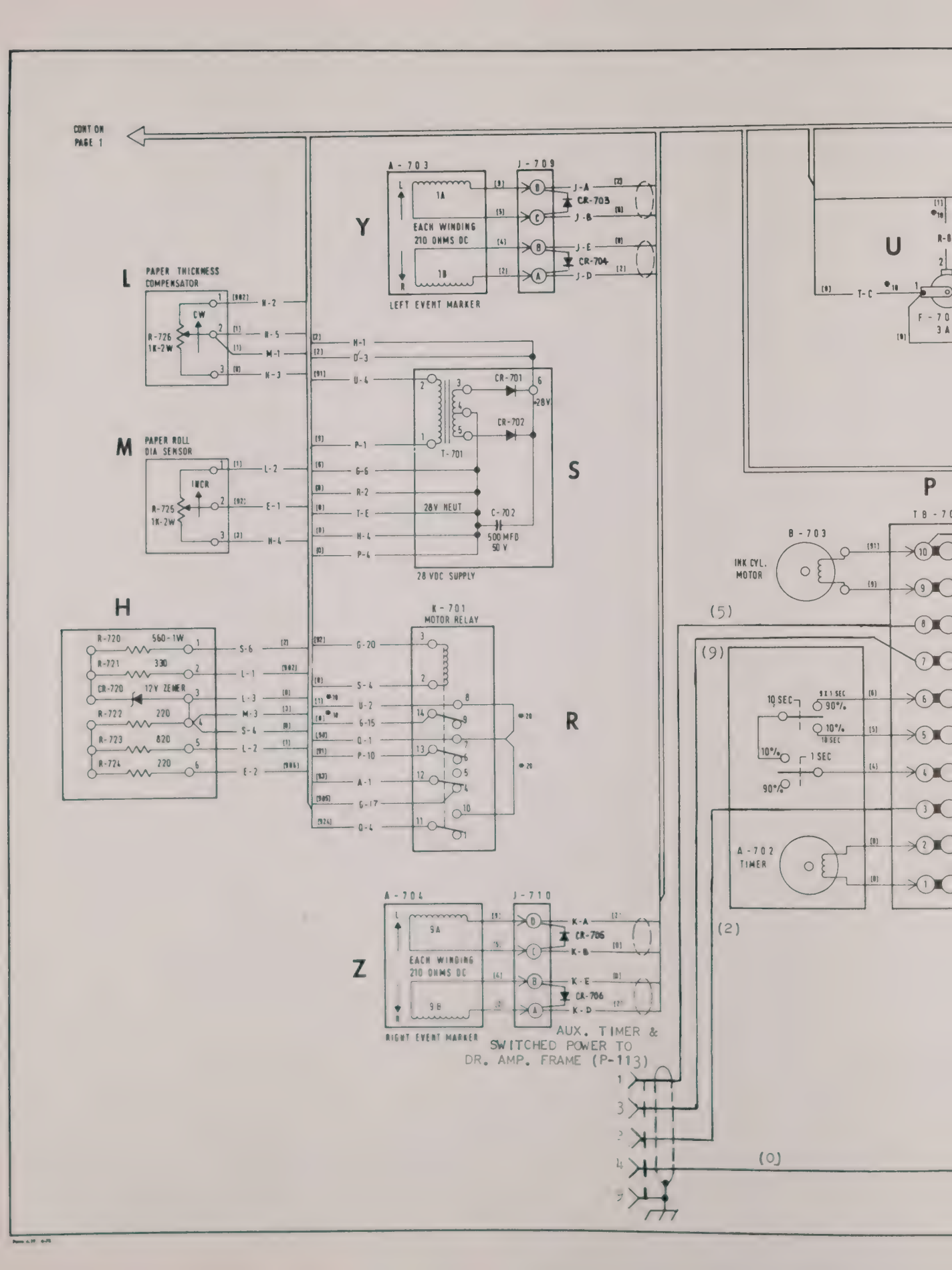
⚠ C-701 INCREASED TO 8 MFD. FOR MODEL 0000-2607-61A51 (50 HZ)

NOTES:

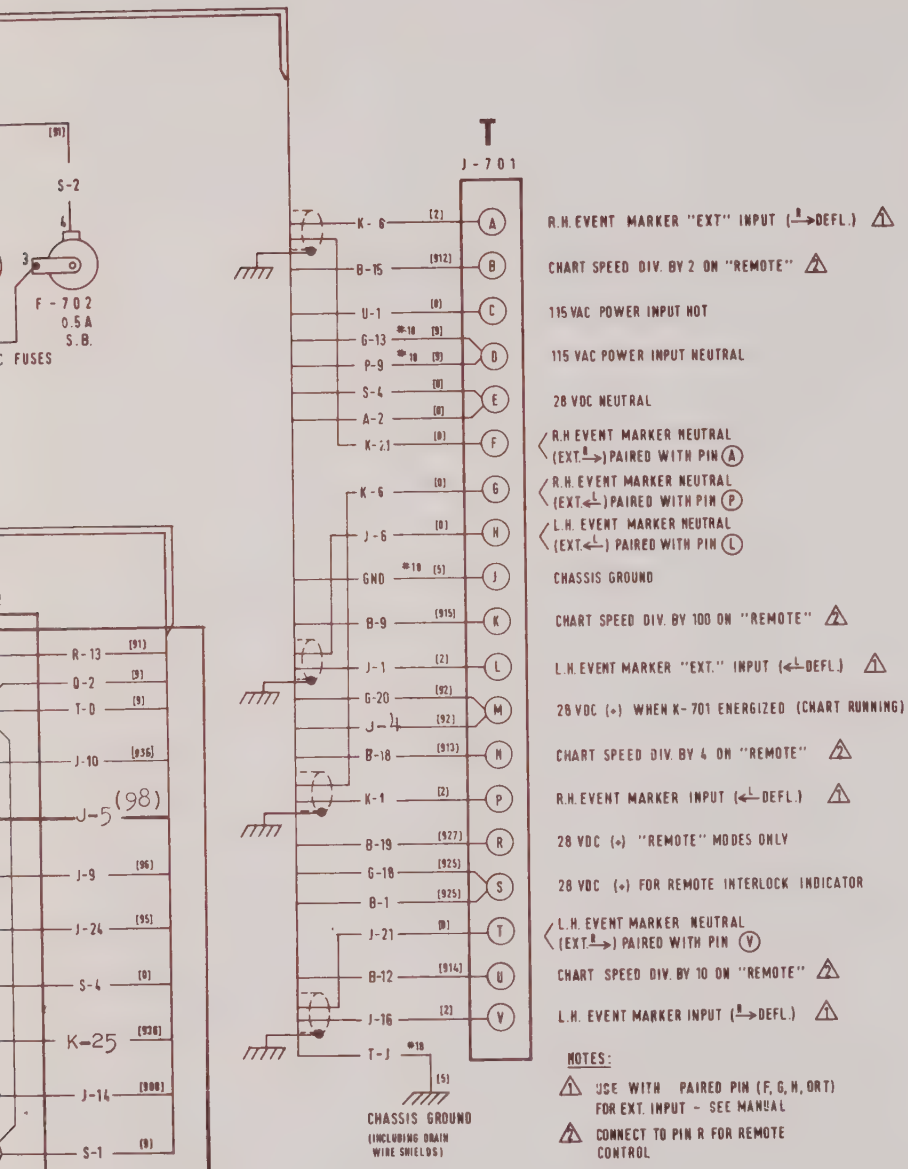
REV. C-1



BY	DATE	NAME		
R. CLARK	11-6-78	SCHEMATIC MOD.# 0000-2607-61		Gould Inc. Instruments Division Cleveland Ohio 44114 U.S.A.
CH Francis	3/79	CODE IDENT. 96795	ISSUE CODE G	DWG 292781
APP R. Gen	3/79			PG. 1 OF 2


CONT ON PAGE 1
A - 703
J - 709
Y
1A
EACH WINDING 210 OHMS DC
1B
LEFT EVENT MARKER
J-A
J-B
J-E
J-D
CR-703
CR-704
L
PAPER THICKNESS COMPENSATOR
R-726 1K-2W
CW
M
PAPER ROLL DIA SENSOR
R-725 1K-2W
IWCR
H
R-720 560-1W
R-721 330
CR-720 12V ZENER
R-722 220
R-723 820
R-724 220
S
CR-701
CR-702
T-701
28V HEUT
C-702
500 MFD 50 V
28 VDC SUPPLY
K - 701
MOTOR RELAY
R
U
F - 70 3 A
P
T B - 7
B - 703
INK CYL. MOTOR
(5)
(9)
10 SEC
9 X 1 SEC
90%
10%
10 SEC
1 SEC
A - 702
TIMER
(2)
(0)
A - 704
J - 710
Z
9A
EACH WINDING 210 OHMS DC
9B
RIGHT EVENT MARKER
K-A
K-B
K-E
K-D
CR-706
AUX. TIMER & SWITCHED POWER TO DR. AMP. FRAME (P-113)

REVISIONS		C-1
SYM.	DESCRIPTION	DATE


T
J-701
K-6 [2] A
B-15 [912] B
U-1 [0] C
G-13 *18 [9]
P-9 *18 [9] D
S-4 [0]
A-2 [0] E
K-21 [0] F
K-6 [0] G
J-6 [0] H
GND *18 [5] J
B-9 [915] K
J-1 [2] L
G-20 [92]
J-14 [92] M
B-18 [913] N
K-1 [2] P
B-19 [927] R
G-18 [925]
B-1 [925] S
J-21 [0] T
B-12 [914] U
J-16 [2] V
T-J *18 [5]
CHASSIS GROUND
(INCLUDING DRAIN WIRE SHIELDS)
R.H. EVENT MARKER "EXT" INPUT (→DEFL.) ⚠1
CHART SPEED DIV. BY 2 ON "REMOTE" ⚠2
115 VAC POWER INPUT HOT
115 VAC POWER INPUT NEUTRAL
28 VDC NEUTRAL
R.H EVENT MARKER NEUTRAL (EXT.→) PAIRED WITH PIN A
R.H. EVENT MARKER NEUTRAL (EXT.←) PAIRED WITH PIN P
L.H. EVENT MARKER NEUTRAL (EXT.←) PAIRED WITH PIN L
CHASSIS GROUND
CHART SPEED DIV. BY 100 ON "REMOTE" ⚠2
L.H. EVENT MARKER "EXT." INPUT (←DEFL.) ⚠1
28 VDC (+) WHEN K-701 ENERGIZED (CHART RUNNING)
CHART SPEED DIV. BY 4 ON "REMOTE" ⚠2
R.H. EVENT MARKER INPUT (←DEFL.) ⚠1
28 VDC (+) "REMOTE" MODES ONLY
28 VDC (+) FOR REMOTE INTERLOCK INDICATOR
L.H. EVENT MARKER NEUTRAL (EXT.→) PAIRED WITH PIN V
CHART SPEED DIV. BY 10 ON "REMOTE" ⚠2
L.H. EVENT MARKER INPUT (→DEFL.) ⚠1
NOTES:
⚠1 USE WITH PAIRED PIN (F, G, H, OR T) FOR EXT. INPUT - SEE MANUAL
⚠2 CONNECT TO PIN R FOR REMOTE CONTROL
S-2
F-702 0.5A S.B.
FUSES
R-13 [91]
Q-2 [3]
T-D [9]
J-10 [936]
J-5 (98)
J-9 [96]
J-24 [95]
S-4 [0]
K-25 [928]
J-14 [908]
S-1 [8]

BY	DATE	NAME		Gould Inc. Instruments Division Cleveland Ohio 44114 U.S.A.
DR R.CLARK	11-16-78	SCHEMATIC MOD.# 0000-2607-61		DWG 292781
CH.	3/79	CODE IDENT. 96795	ISSUE CODE G	PG. 2 OF 2

1 UNLESS OTHERWISE INDICATED
ALL CAPACITANCE IN MICROFARADS
ALL RESISTANCE IN OHMS
ALL RESISTORS 1/2 WATT
ALL WIRES 22 AWG

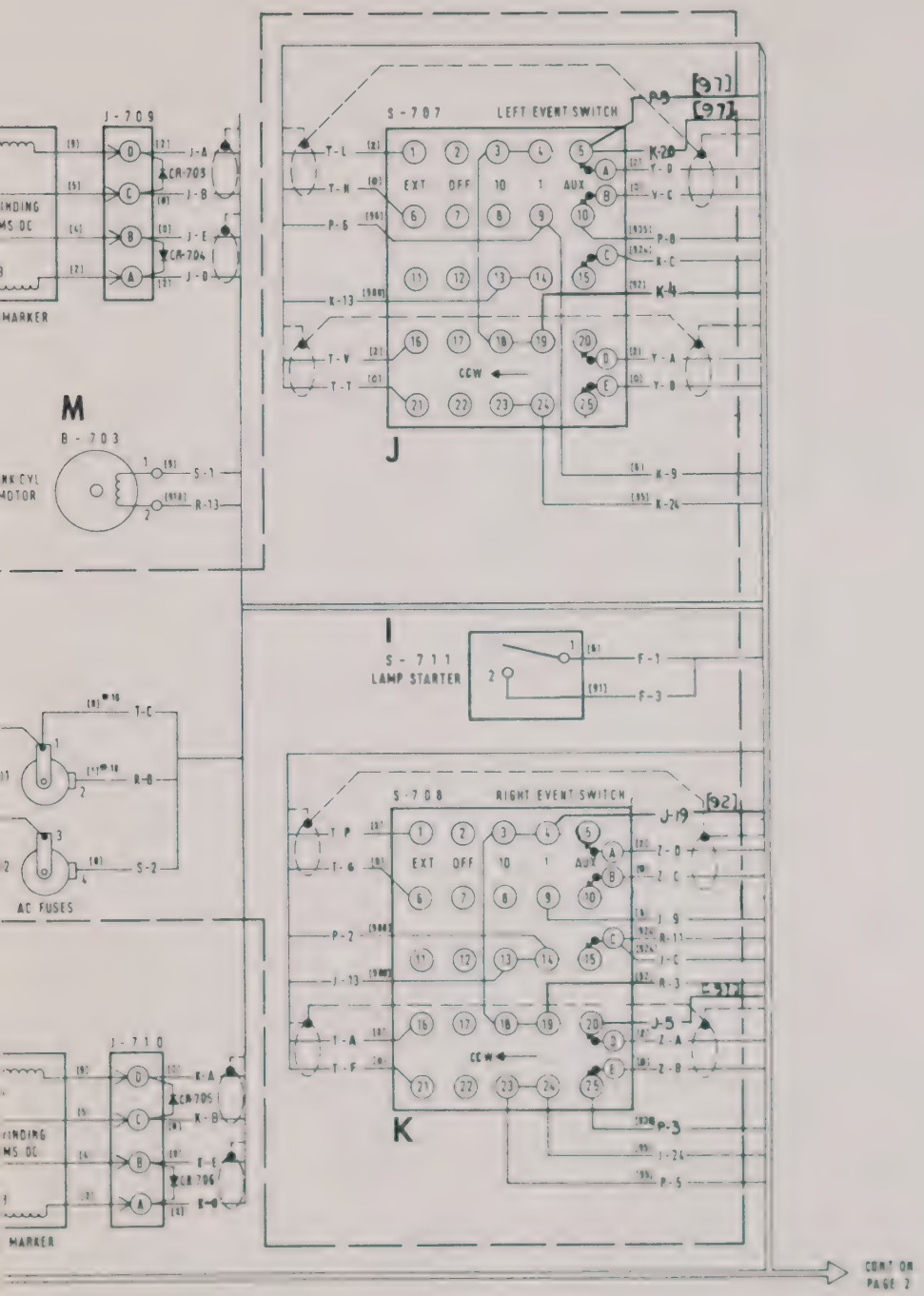
2 WIRE COLORS IN EIA CODE SHOWN IN BRACKETS

3 OPEN ARROW AT TERMINAL INDICATES PIN OR LUG TERMINATION

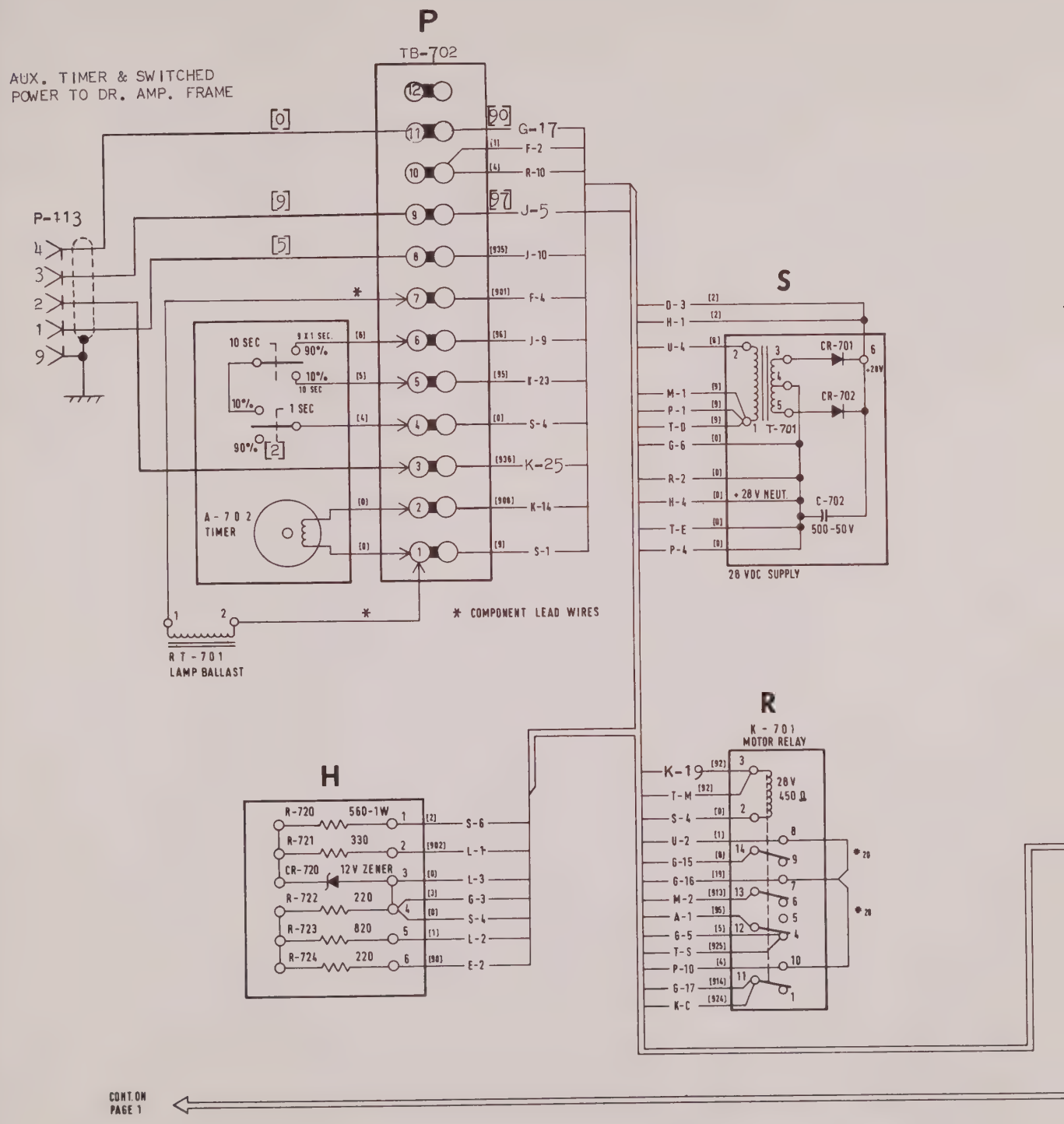
NOTES

⚠ FOR MODEL NO. 0000-2607-71A51 (50 HZ) C-701 IS 8 MFD-330 VAC.

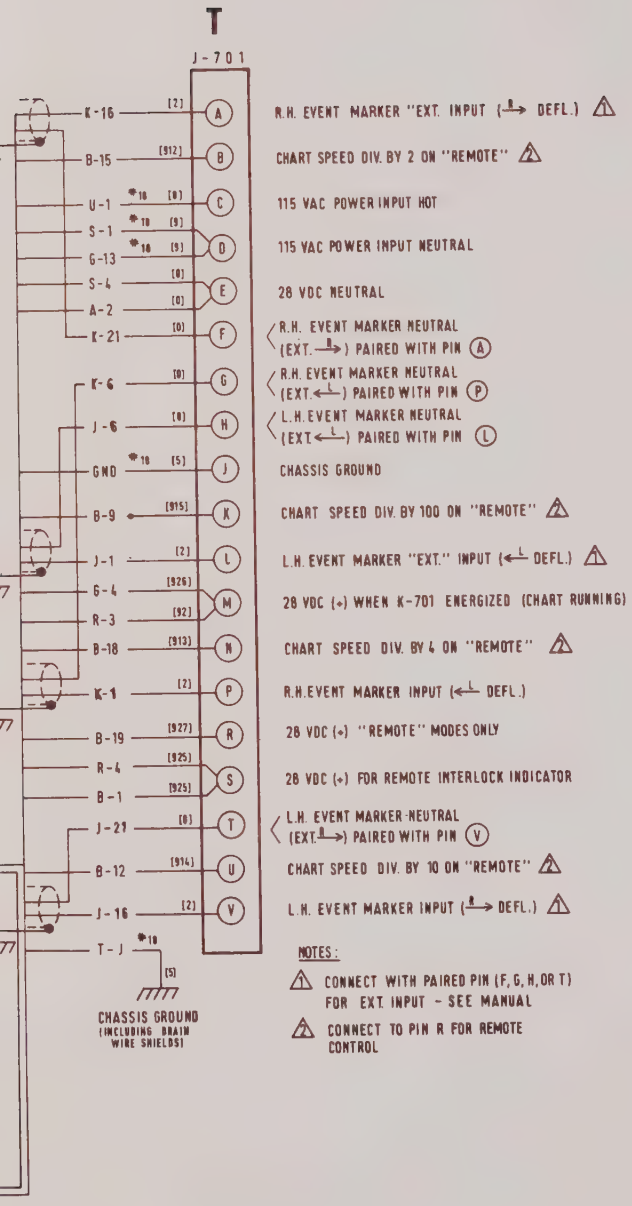
REV. B-1



	MOD. #0000-2607-71		292585
	96795		


P
TB-702
AUX. TIMER & SWITCHED
POWER TO DR. AMP. FRAME
P-113
[0]
[9]
[5]
*
10 SEC
9 X 1 SEC.
90%
10%
10 SEC
1 SEC
[6]
[5]
[4]
[2]
A-702
TIMER
[0]
[0]
[90] G-17
[1] F-2
[4] R-10
[97] J-5
[935] J-10
[901] F-4
[96] J-9
[95] K-23
[0] S-4
[936] K-25
[908] K-14
[9] S-1
* COMPONENT LEAD WIRES
RT-701
LAMP BALLAST
S
D-3
H-1
U-4
M-1
P-1
T-D
G-6
R-2
H-4
T-E
P-4
T-701
CR-701
CR-702
+28V
+28 V NEUT.
C-702
500-50V
28 VDC SUPPLY
R
K-701
MOTOR RELAY
K-19
T-M
S-4
U-2
G-15
G-16
M-2
A-1
G-5
T-S
P-10
G-17
K-C
28V
450Ω
H
R-720 560-1W
R-721 330
CR-720 12V ZENER
R-722 220
R-723 820
R-724 220
S-6
L-1
L-3
G-3
S-4
L-2
E-2
CONT. ON
PAGE 1

REVISIONS		B-1
SYM.	DESCRIPTION	DATE



R.H. EVENT MARKER "EXT. INPUT (→ DEFL.) ⚠1

CHART SPEED DIV. BY 2 ON "REMOTE" ⚠2

115 VAC POWER INPUT HOT

115 VAC POWER INPUT NEUTRAL

28 VDC NEUTRAL

R.H. EVENT MARKER NEUTRAL (EXT. →) PAIRED WITH PIN (A)

R.H. EVENT MARKER NEUTRAL (EXT. ←) PAIRED WITH PIN (P)

L.H. EVENT MARKER NEUTRAL (EXT ←) PAIRED WITH PIN (L)

CHASSIS GROUND

CHART SPEED DIV. BY 100 ON "REMOTE" ⚠2

L.H. EVENT MARKER "EXT." INPUT (← DEFL.) ⚠1

28 VDC (+) WHEN K-701 ENERGIZED (CHART RUNNING)

CHART SPEED DIV. BY 4 ON "REMOTE" ⚠2

R.H. EVENT MARKER INPUT (← DEFL.)

28 VDC (+) "REMOTE" MODES ONLY

28 VDC (+) FOR REMOTE INTERLOCK INDICATOR

L.H. EVENT MARKER-NEUTRAL (EXT. →) PAIRED WITH PIN (V)

CHART SPEED DIV. BY 10 ON "REMOTE" ⚠2

L.H. EVENT MARKER INPUT (→ DEFL.) ⚠1

NOTES:

⚠1 CONNECT WITH PAIRED PIN (F, G, H, OR T) FOR EXT. INPUT - SEE MANUAL

⚠2 CONNECT TO PIN R FOR REMOTE CONTROL

BY	DATE
DR R. CLARK	2/1/79
CH	
APP R. Gal	2/79

NAME: SCHEMATIC

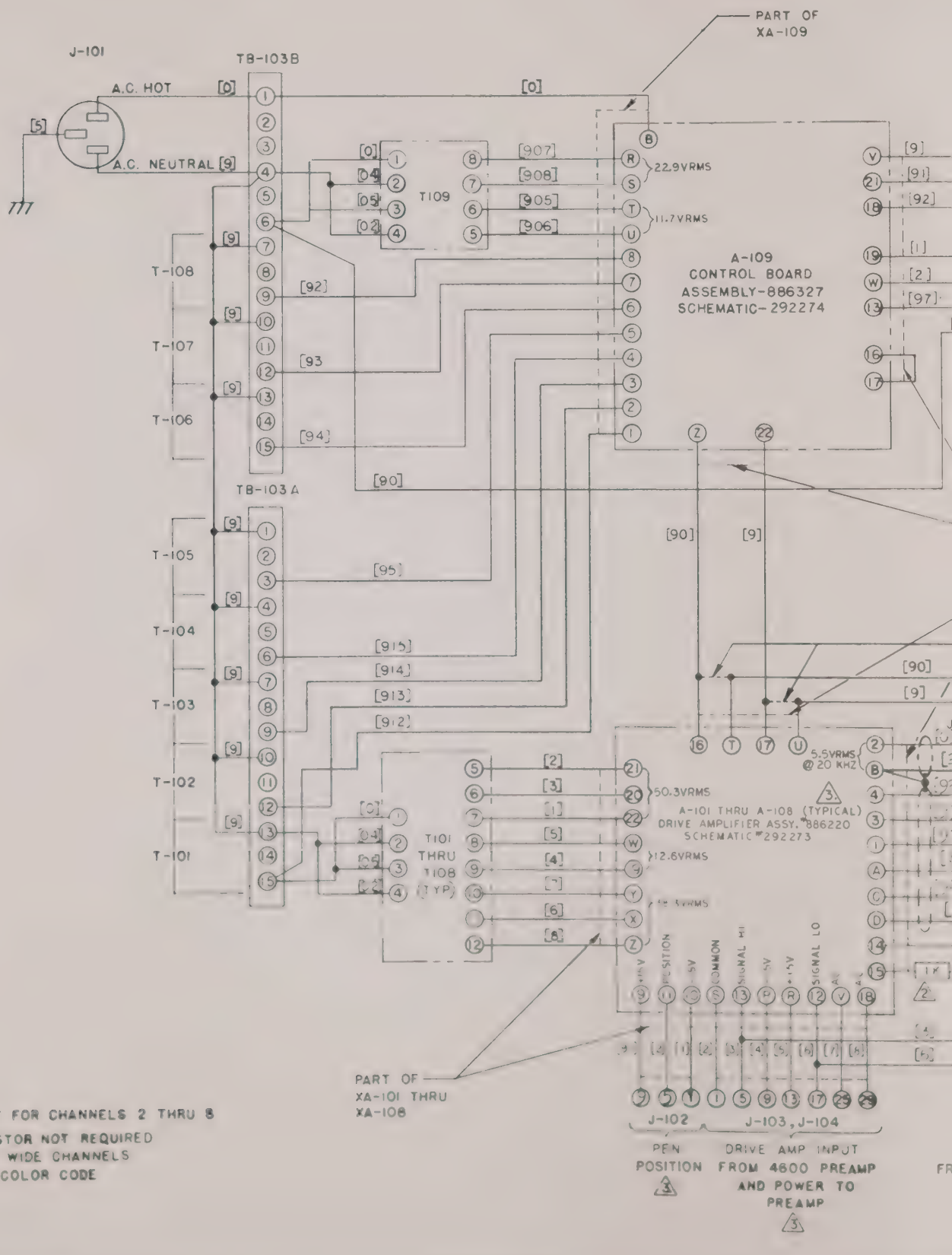
MOD. # 0000-2607-71

CODE IDENT. 96795 | ISSUE CODE G

Gould Inc.
Instruments Division
Cleveland Ohio 44114 U.S.A.

DWG. NO. 292585

PG. 2 OF 2



3. SEE CHART FOR CHANNELS 2 THRU 8
2. GAIN RESISTOR NOT REQUIRED ON 80 MM. WIDE CHANNELS
1. [ ] = E.I.A. COLOR CODE

NOTES:

REV. B-1

J-114

TTL EVENT MARKER INPUT

J-113

SWITCHED POWER TO CONTROL BOARD FROM RECORDER AND TIMER OUTPUT

PART OF XA-109

PART OF XA-101 THRU XA-108

(JUMPING FOR CHANNELS 2 THRU 8. NO JUMPING USED ON CHANNEL 1.)

XA-102

05 THRU J-112 (TYP)

MET. PRI.

MET. SEC.

VEL. COIL

DRIVE COIL

DRIVE AMPLIFIER OUTPUT TO PENMOTORS

LO HI

TB-1

RIVE AMP INPUT
M SELF POWERED
PREAMP

3

3. CHANNEL 1 THRU 8 CONNECTION CHART

CHANNEL	TB-103A HOT			TB-103A NEUT.	P-103/J-103 TERM USED							P-102/J-102 TERM USED			TB-1 HI	TB-1 LO
1	15	14	13		1	5	9	13	17	25	29	1	5	9	10	11
2	12	11	10		2	6	10	14	18	26	30	2	6	10	7	8
3	9	8	7		3	7	11	15	19	27	31	3	7	11	4	5
4	6	5	4		4	8	12	16	20	28	32	4	8	12	1	2
					P-104/J-104 TERM. USED										TB-2 TERM. USED	
5	3	2	1		1	5	9	13	17	25	29	13	17	21	10	11
	TB-103B TERM. USED															
6	15	14	13		2	6	10	14	18	26	30	14	18	22	7	8
7	12	11	10		3	7	11	15	19	27	31	15	19	23	4	5
8	9	8	7		4	8	12	16	20	28	32	16	20	24	1	2

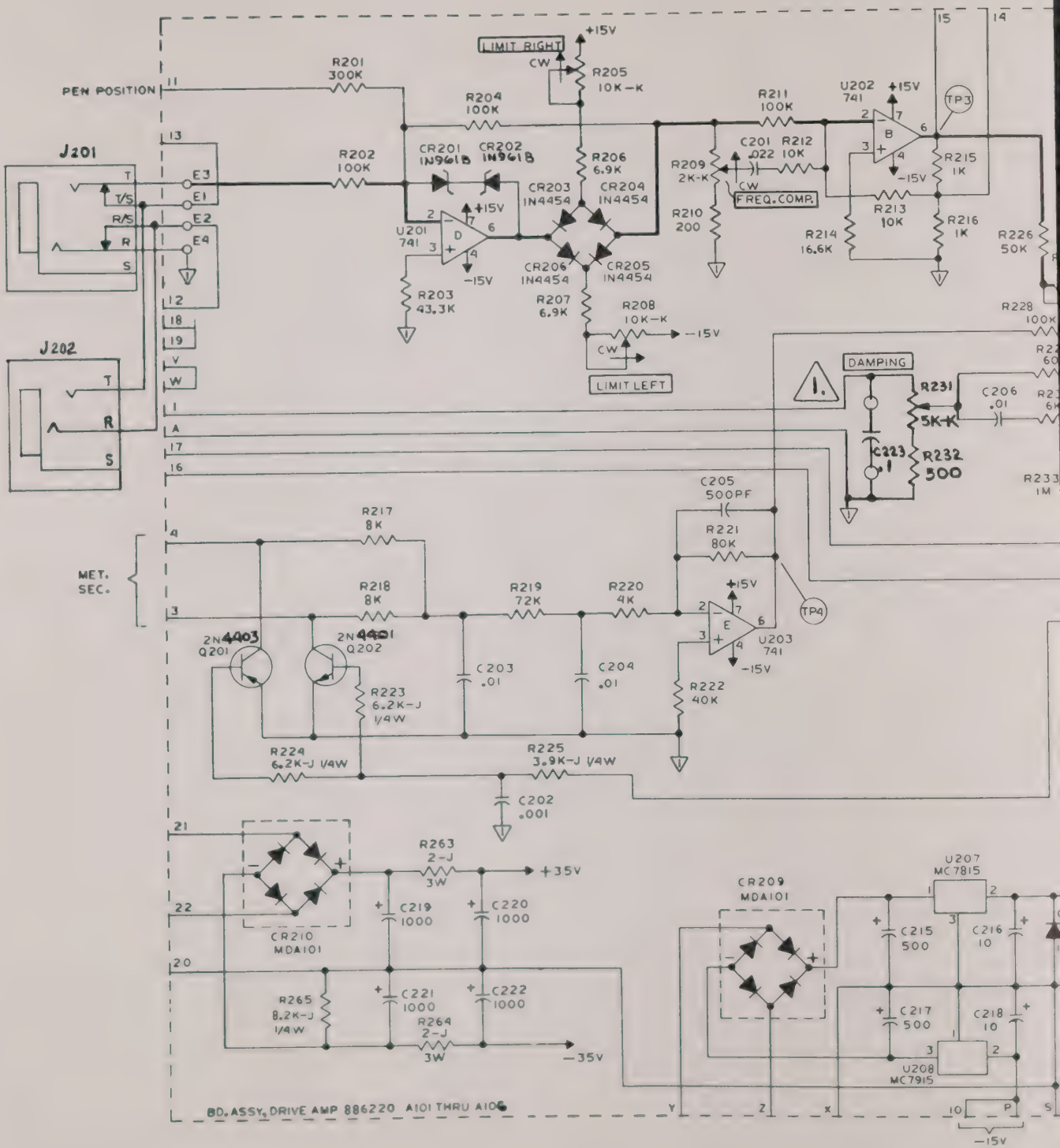
BY	DATE
DR R. CLARK	12/4/78
CH	1/15/79
APP	1/16/79

NAME: WIRING DIAGRAM DR. AMP. ASSY 692454

CODE IDENT. 96795 | ISSUE CODE G

Gould Inc.
Instruments Division
Cleveland, Ohio 44114 U.S.A.

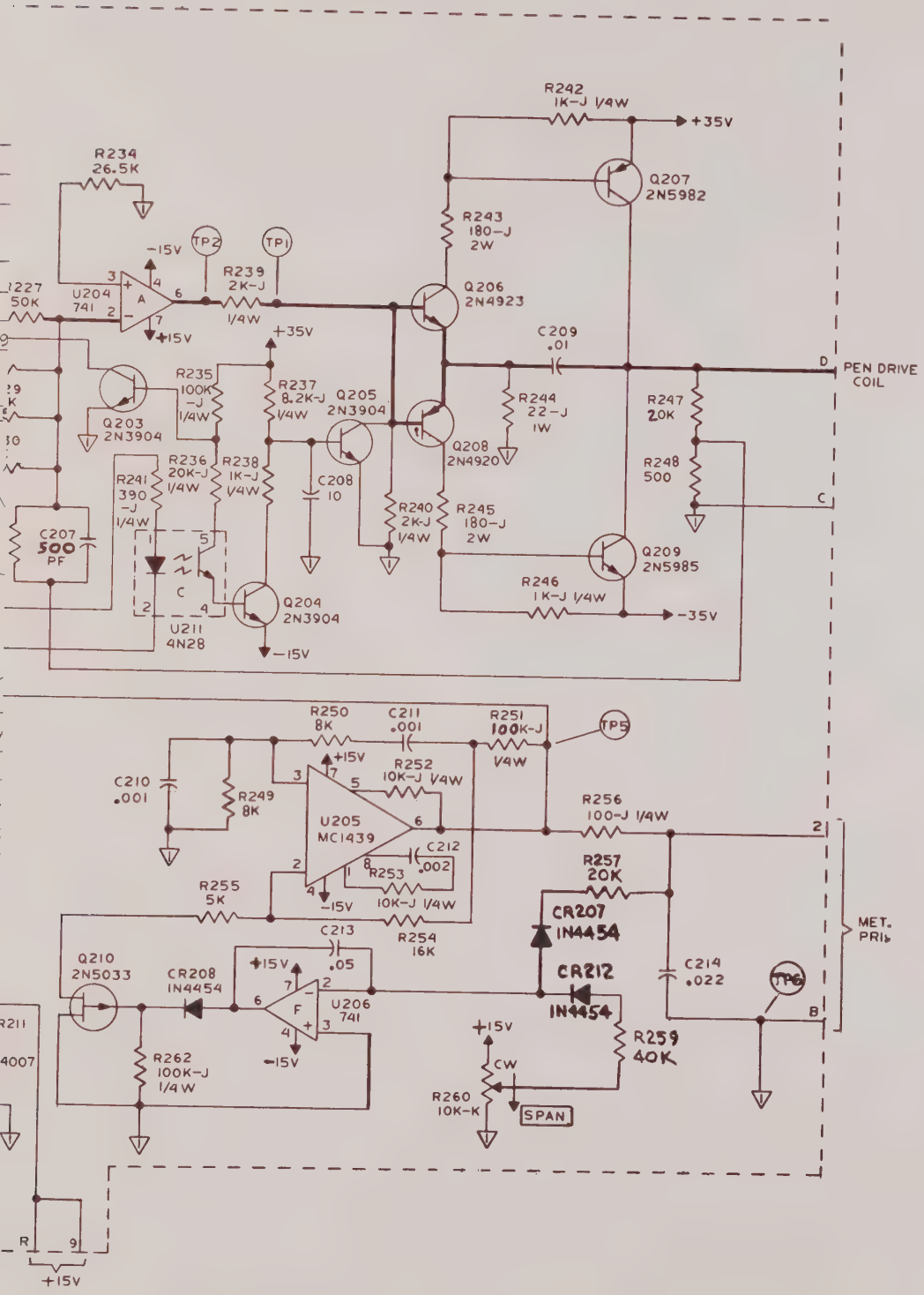
DWG. NO. 292560



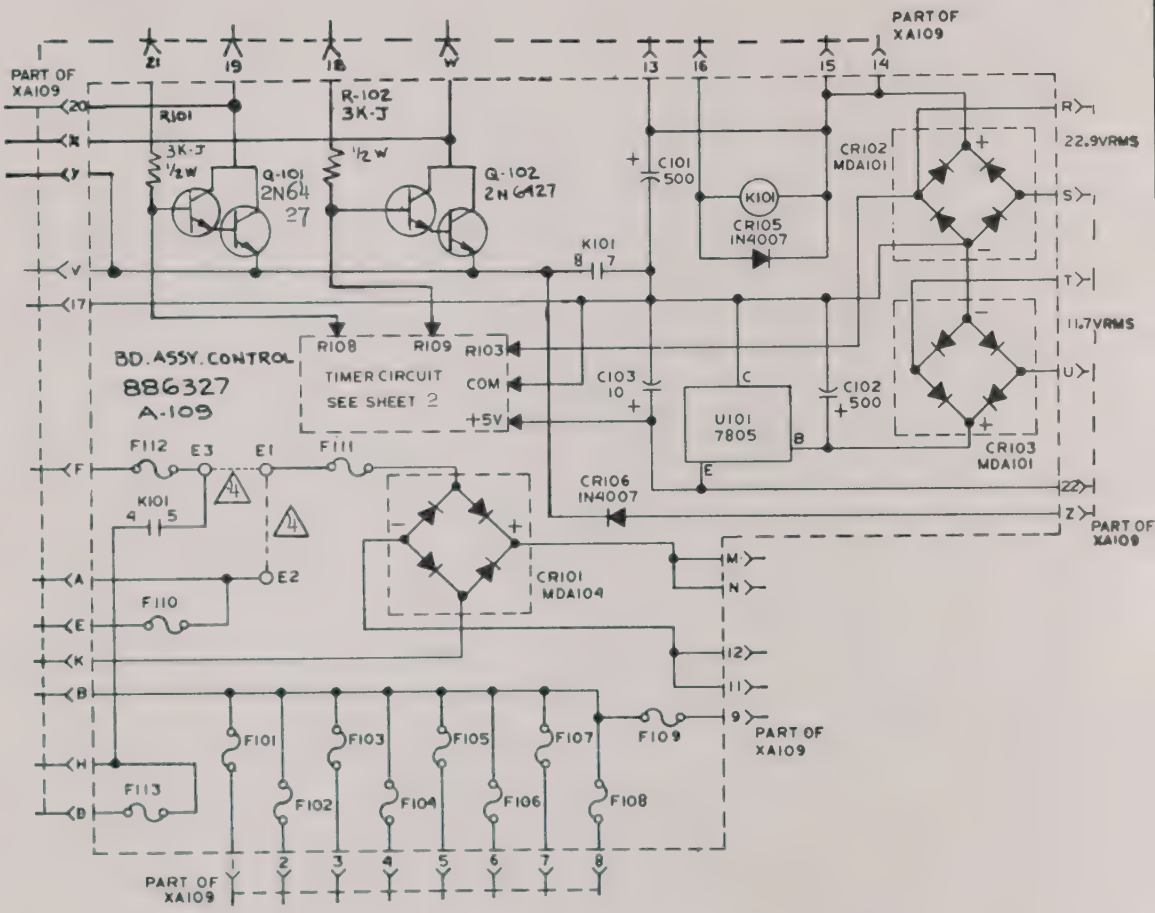
1. C223 USED ONLY IN 80 MM APPLICATIONS.

NOTES:

REV. B-1



BY	DATE	NAME	SCHEMATIC AMPLIFIER ASSY, DRIVE 886220	Gould Inc. Instruments Division Cleveland, Ohio 44114 U.S.A.
DR R. CLARK	12/9/78			
CH		CODE IDENT. 96795	ISSUE CODE G	DWG NO. 292273
APP R. Gan	2/7/79			



4. FOR INK WRITING UNITS PUT JUMPER FROM PIN E3 TO E1. FOR THERMAL WRITING UNITS PLACE JUMPER FROM PIN E1 TO E2.

3. ONLY FUSES SUPPLIED ON MODEL 200 RECORDER.

2. USED ONLY ON 2200 RECORDER.

1. NOT SUPPLIED ON 2200 RECORDER.

NOTES:

REV. C-1

INK RECORDER FUSE TABLE

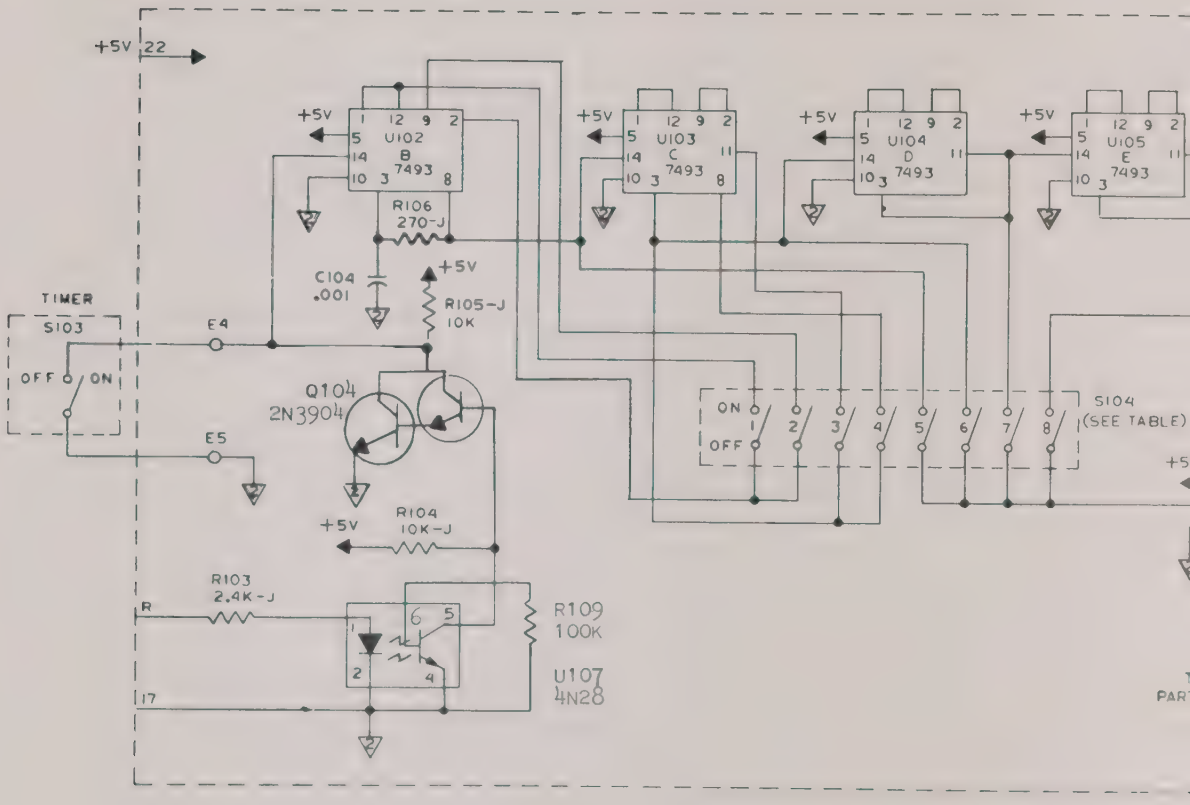
FUSE SYMBOL	LINE VOLTAGE & FREQ. 115V 60HZ	115V 400HZ	230V 50HZ	115V 50HZ	COMPONENT FUSED	
F101 - F108	3/4A 125V	3/4A 125V	1/2A 250V	1A 125V	T101-T108	3.
F109	1/4A 125V	1/4 125V	1/4 250V	3/8A 125V	T109	
F110	1/4A 125V	1/4 125V	1/8A 250V	1/4 125V	B102	1.
F111 W/1 INK SOLENOID	1/4A 125V	1/4A 125V	1/8A 250V	1/4A 125V	L105	
F111 W/2 INK SOLENOID	1/2A 125V	1/2A 125V	1/4A 250V	1/2A 125V	L105 L106	
F111	1/8A 125V	———	1/16A 250V	1/8A 125V	L105	2.
F112	2A 125V	———	3/4A 250V	2A 125V	B101	2.
F112	1.5A 125V	7A 125V	3/4A 250V	1.5A 125V	B101	
F113	3A 125V	3A 125V	1.5A 250V	3A 125V	J102	1.

THERMAL FUSE TABLE

FUSE	LINE VOLTAGE & FREQ. 115/60	230/50	115/50	COMP. FUSED	
F101	3/4A	1/2A	1A	T101-T108	
F109	1/4A	1/4A	3/8A	T109	
F110	1/4A	1/8A	1/4A	B102	1.
F111	5A	2-1/2A	5A	PEN HEAT	
F112	1-1/2A	3/4A	1-1/2A	B101	
F113	3A	1-1/2A	3A	J102	1.

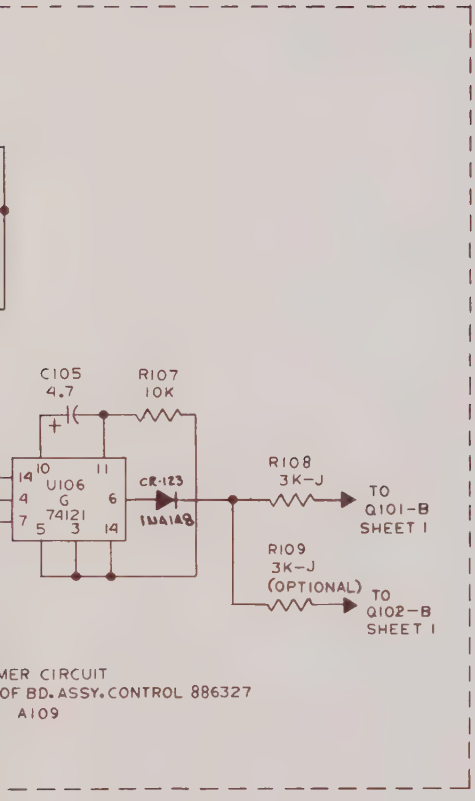
BY	DATE	NAME	SCHEMATIC
DR R. CLARK	2/9/77		BOARD ASSY, CONTROL
CH Francis	2/77		886327
APP R. GEK	2/77	CODE IDENT. 96795	ISSUE CODE G

Gould Inc.
Instruments Division
Cleveland Ohio 44114 U.S.A.
DWG NO. 292274
PG. 1 OF 2



S104 SW. SETTINGS FOR VARIOUS																
LINE FREQ.	50 HZ										60H					
REP. RATE	SW ON			SW OFF					SW ON							
.1 SEC	1	3	5	2	4	6	7	8	2	3	5					
1.0 SEC	1	3	6	2	4	5	7	8	2	3	6					
10.0 SEC	1	3	7	2	4	5	6	8	2	3	7					
100.0 SEC	1	3	8	2	4	5	6	7	2	3	8					
.01 MIN	1	4	6	2	3	5	7	8	2	4	6					
.10 MIN	1	4	7	2	3	5	6	8	2	4	7					
1.0 MIN	1	4	8	2	3	5	6	7	2	4	8					

REVISIONS			C-1
SYM.	DESCRIPTION	DATE	

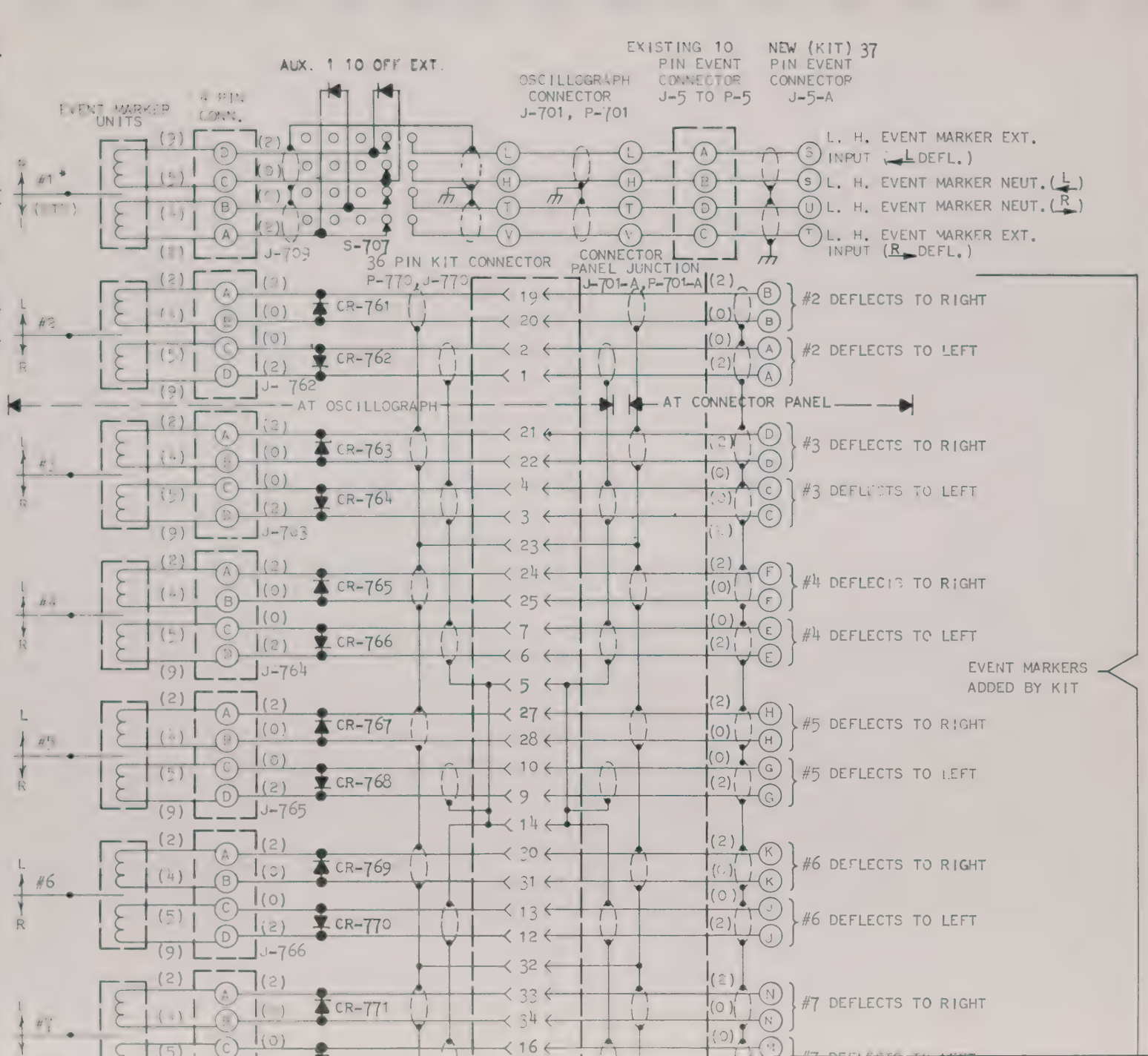


MER CIRCUIT
OF BD. ASSY. CONTROL 886327
A109

EPETITION RATES

	400 HZ		
W OFF	SW ON	SW OFF	
6 7 8	3 6	1 2 4 5 7 8	
5 7 8	3 7	1 2 4 5 6 8	
5 6 8	3 8	1 2 4 5 6 7	
5 6 7	—	—	
5 7 8	4 7	1 2 3 5 6 8	
5 6 8	4 8	1 2 3 5 6 7	
5 6 7	—	—	

BY	DATE	NAME	Gould Inc. Instruments Division Cleveland Ohio 44114 U.S.A.
DR R. CLARK	2/9/79	SCHEMATIC BOARD ASSY, CONTROL 886327	
CH	2/79		
AP R. GEIL	2/79		
		CODE IDENT. 96795 ISSUE CODE G	DWG NO. 292274
			PG. 2 OF 2



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REV. A-3

*5. EVENT CHANNELS #1 AND #9 SHOWN FOR REFERENCE ONLY.

4. SMALL TYPED LETTERS (AS OPPOSED TO LARGE LETTERS) SIGNIFY THE LOWER CASE LETTERS SHOWN ON THE CONNECTOR.

3. OBSERVE POLARITY TO MAKE PIN A OR D OF EVENT MARKER GO POSITIVE AND RUN FROM A. C. POWER SWITCHED BY "STOP" BUTTON ON OSCILLOGRAPH.

2. THIS DIAGRAM FOR -00 VERSION. FOR -01 VERSION DISREGARD #5 THRU #8 EVENT MARKERS AND WIRING.

1. WIRE COLORS IN EIA CODE SHOWN IN PARENTHESES ( ).

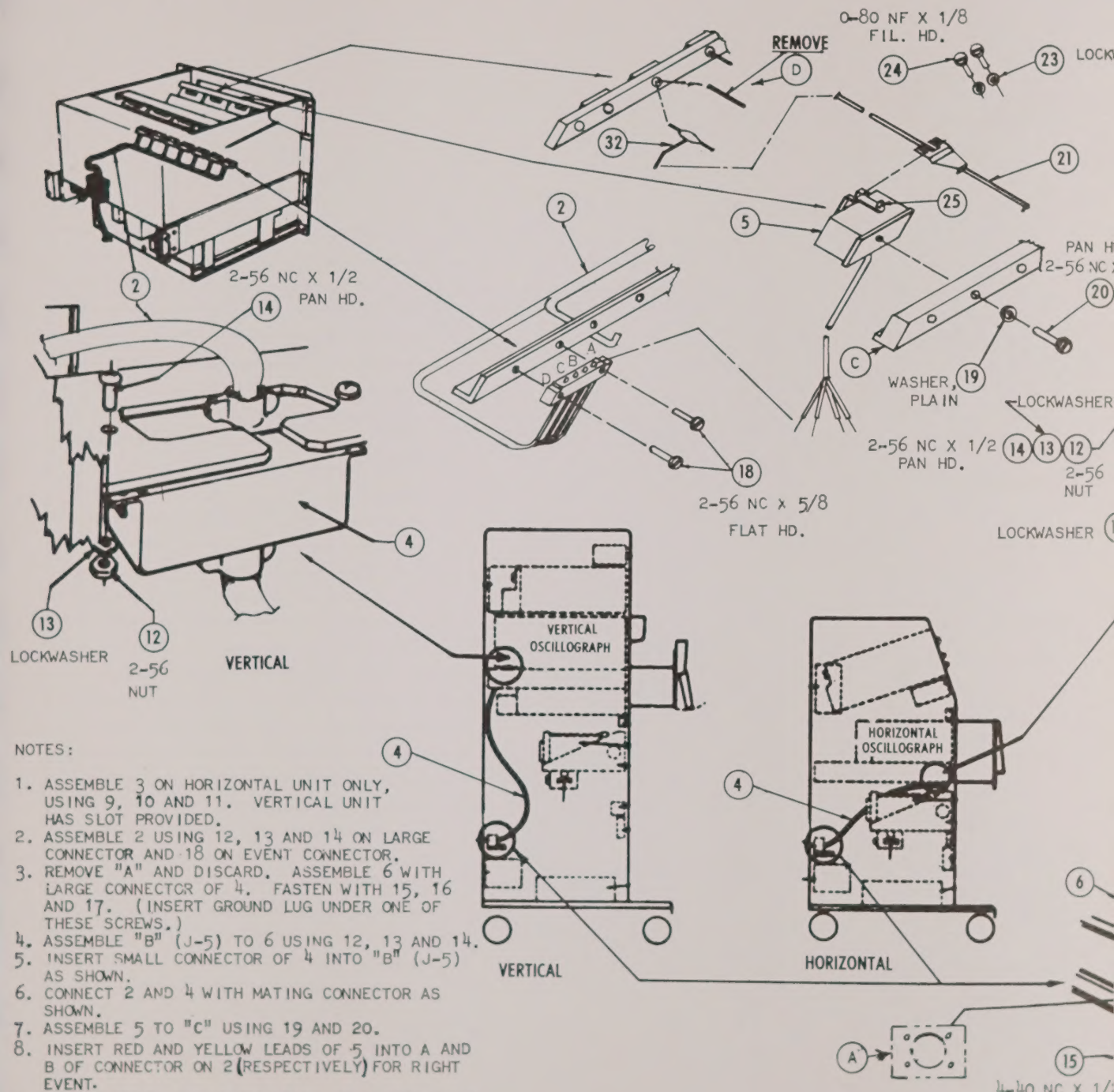
NOTES:

MODEL NO. 11-2221-02

Gould Inc.
Instrument Systems Division
Cleveland, Ohio 44114 U.S.A.

BY	DATE	NAME
DR	7-15-65	DIAGRAM, WIRING
CH		MODEL NO. 11-2221-00
APP		MODEL NO. 11-2221-01

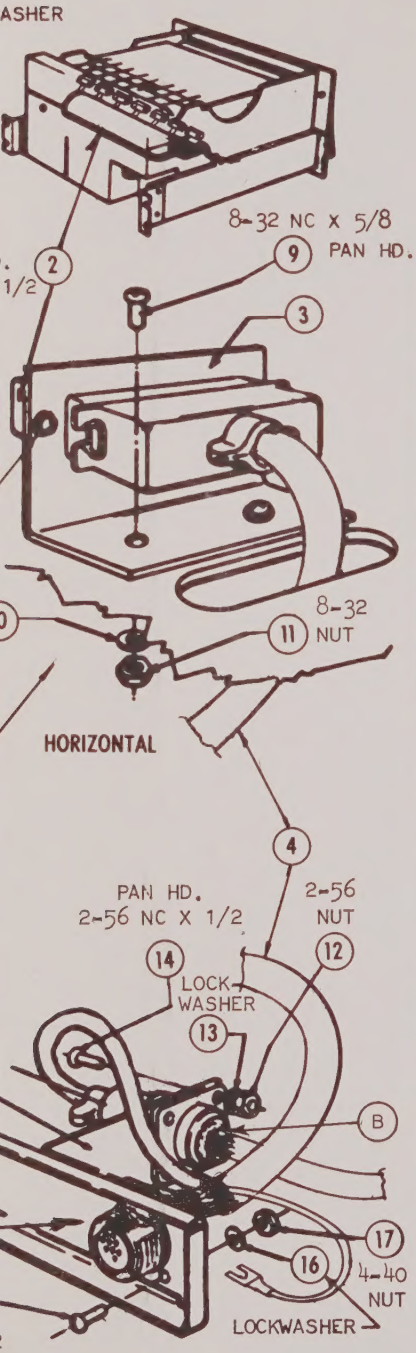
CODE IDENT. | ISSUE CODE G | DWG. NO. 262388 | SHEET 1 OF 1



NOTES:

1. ASSEMBLE 3 ON HORIZONTAL UNIT ONLY, USING 9, 10 AND 11. VERTICAL UNIT HAS SLOT PROVIDED.
2. ASSEMBLE 2 USING 12, 13 AND 14 ON LARGE CONNECTOR AND 18 ON EVENT CONNECTOR.
3. REMOVE "A" AND DISCARD. ASSEMBLE 6 WITH LARGE CONNECTOR OF 4. FASTEN WITH 15, 16 AND 17. (INSERT GROUND LUG UNDER ONE OF THESE SCREWS.)
4. ASSEMBLE "B" (J-5) TO 6 USING 12, 13 AND 14.
5. INSERT SMALL CONNECTOR OF 4 INTO "B" (J-5) AS SHOWN.
6. CONNECT 2 AND 4 WITH MATING CONNECTOR AS SHOWN.
7. ASSEMBLE 5 TO "C" USING 19 AND 20.
8. INSERT RED AND YELLOW LEADS OF 5 INTO A AND B OF CONNECTOR ON 2 (RESPECTIVELY) FOR RIGHT EVENT.
9. INSERT GREEN AND WHITE LEADS OF 5 INTO C AND D OF CONNECTOR ON 2 (RESPECTIVELY) FOR LEFT EVENT.
10. ASSEMBLE 21 USING 23 AND 24.
11. REMOVE "D" FROM MANIFOLD, INSERT 32.
12. REPLACE PEN TUBE ON 32 AND INSERT PEN TUBE OF 21 ON 32 AS SHOWN.
13. ADJUST PEN PRESSURE OF 21 USING 25. VERTICAL PEN PRESSURE TO BE 20 TO 22 GRAMS. IF TRACE DENSITY VARIES, LAP PENS.
14. (SEE 26) MATE FOR CONNECTOR BRUSH PART NO. 241966 USED ON 4.
15. REMOVE LABELS ("E1" THRU "E5") PARTS OF ITEMS-5

REVISIONS			
SYM.	DESCRIPTION	DATE	APPROVAL



ITEM	PART NUMBER	DESCRIPTION	REMARKS	QTY
34	692792	SHIP. LIST & INSTALL. INSTR.	PRINT ONLY	1
33	262388	DIAGRAM, WIRING		1
32	662095	TUBE ASSEMBLY	PART OF ITEM-1	X
31				
30	222640	CARD, CONCEALED DAMAGE		1
29	118259-12	BUSHING, CABLE CLAMP	USED WITH ITEM #26	1
28	118259-16	BUSHING, CABLE CLAMP		1
27	119993-116	CLAMP, CABLE		1
26	241965	CONNECTOR	SEE NOTE #14	1
25	241073-1202	SCREW	PART OF ITEM #5	X
24	20-119917-0002	SCREW	PART OF ITEM #5	X
23	128777-102	LOCKWASHER	PART OF ITEM #5	X
22				
21	11-2821-22	PEN ASSEMBLY, INK		7
20	31-119917-2604	SCREW	PART OF ITEM-5	X
19	1-216741-401	LOCKWASHER	PART OF ITEM-5	X
18	31-119920-2606	SCREW		14
17	31-119998-40	NUT		4
16	1-216741-411	LOCKWASHER		4
15	31-119918-4008	SCREW		4
14	31-119918-2608	SCREW		6
13	1-216741-401	LOCKWASHER		6
12	31-119998-26	NUT		6
11	31-119998-82	NUT		2
10	1-216741-425	LOCKWASHER		2
9	31-119918-8210	SCREW		2
8				
7				
6	341999	BRACKET, CONNECTOR	PART OF ITEM #1	X
5	792567	KIT ASM. EVENT MARKER	PART OF ITEM #1	X
4	862173	CABLE ASM.	PART OF ITEM #1	X
3	341988	BRACKET, CONNECTOR	PART OF ITEM #1	X
2	862172	CABLE ASM.	PART OF ITEM #1	X
1	11-2221-02	KIT ASM., EVENT MARKER	7 INTERCHANNEL	1

LIST OF MATERIAL

0000 170 -XXX	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE PLATING .XXX = ± .005 SURFACE FINISH .XX = ± .015 .X = ± .06 ANGLES = ± 0° 30'	BY / DATE: DR. FOWLER 3-19-79; CH. Lorencis 3-22-79; APP. [illegible] 3-23-79	NAME: SHIPPING LIST AND INSTALLATION INSTRUCTIONS	Gould Inc. Instruments Division Cleveland, Ohio 44114 U.S.A.
FIRST USE	MATL.	ADD. FIN.	FED. CODE NO. 96795; ISSUE CODE G; SCALE NONE	DWG. NO. 692792

MP MASTER
MA34561

Gould Inc., Instruments Division
3631 Perkins Avenue, Cleveland, Ohio 44114
Telephone (216) 361-3315

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